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UNIVERSITY OF ALBERTA

APPETITE, SOCIABILITY, IRRITABILITY AND PREMENSTRUAL COMPLAINT

by

MARGARET MAREAN

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND
RESEARCH IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF . . . . Master of Education . . . .

IN

COUNSELLING PSYCHOLOGY
DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Appetite, Sociability, Irritability and Premenstrual Complaint submitted by Margaret Marean in partial fulfillment of the requirements for the degree of Master of Education in Counselling Psychology.

E. E. Fox

Dr. E.E. Fox

Dr. D.C. Cumming

Dr. C.E. Cumming

Date: July 27, 1992

DEDICATION

To my husband, David, and my daughters,
Courtney and Kaela,
who will always come first in my life.

Abstract

The purpose of the present study was to determine whether differences in food intake, liquid intake, appetite, sociabilty and irritability occured over three phases of the menstrual cycle in women with premenstrual complaint. Statistically significant increases in irritability and decreases in sociability were found in the premenstrual phase as compared to the intermenstrual phase of the menstrual cycle. Changes in food intake, liquid intake and appetite were not found to be significant.

The sample consisted of 20 women with premenstrual complaint who were healthy, were within reproductive age (25 to 45 years), and were not using oral contraceptives or other medication that might interfere with normal cyclic variations. Premenstrual changes were confirmed using the Premenstrual Assessment Form (Halbreich, Endicott & Schact, 1982) and the Daily Record Symptom Chart (Dennerstein, Spencer-Gardner & Burrows, 1984). Levels of irritability and sociability were assessed using the Sociability-Irritability (STI) Test, a 5-point scale comprised of 2 subscales from the Multiscore Depression Inventory (Berndt, 1983). Food and liquid intake was recorded on the Daily Food and Liquid Intake Chart. Cravings, appetite level and stressful daily events were also recorded on this form. Demographic data was collected at the beginning of the study.

A control group of 8 women was compared to the sample of premenstrual complainers. Significant differences were found in levels of premenstrual irritability and sociability between the two groups. Differences in liquid intake were significant between the premenstrual complaint and the control group, with the control group consuming higher quantities over all three menstrual phases. No differences were found in food intake or appetite level.

Food intake, liquid intake, sociability and irritability were graphed for each of the premenstrual complainers. Fluctuations in these variables during the premenstrual phases were visually compared to fluctuations during stressful periods. It appears that the premenstrual phase caused more fluctuation in variables than did daily life stressors for this sample of women.

The study has implications for education, for counselling and for further research related to coping styles and to the effects of stress alleviation.

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Chapter I

Introduction

Premenstrual syndrome (PMS) is defined as a cluster of physical and emotional changes that affects a large number of women on a cyclic, premenstrual basis. The effects of this syndrome on the well-being of women seem to vary from mild to severe. Although estimates of prevalence range from 20% to 90% (Osofsky, Keppel & Kuczmierczyk, 1988), Woods, Most and Dery (1982a) conclude that between 2% to 8% of women have symptoms severe enough to disrupt their daily routines.

Over 150 symptoms have been ascribed to PMS (Warner & Bancroft, 1990). These symptoms range from physical changes such as breast tenderness, bloating, fluid retention, craving for sweet or salty foods, dizziness, headaches, altered sexual drive, changes in sleep patterns and acne to psychological changes such as lethargy, anxiety, irritability, aggression, depression, mood swings and restlessness. A premenstrual increase in negative moods is reported by virtually all women who complain of premenstrual syndrome (Bancroft & Backstrom, 1985; Rubinow & Roy-Byrne, 1986; Youdale & Freeman, 1987). The definition and components of premenstrual syndrome are expanded in the literature review of this thesis. The purpose of the present research is to determine whether changes occur in the psychological constructs of sociability and irritability and in the behavioral constructs of food intake, liquid intake and appetite level over different phases of the menstrual cycle. Following is a brief outline of the main points considered in implementing the research questions.

Several problems are encountered in the study of premenstrual syndrome. There is no one definition of premenstrual syndrome that is accepted by all authors. The syndrome covers a wide variety and number of symptoms, none of which are specific to premenstrual syndrome. As well, a cutoff point for severity of symptoms has not been agreed upon by researchers (Hurt et al, 1992; Reid, 1985; Rubinow, Hoban & Grover, 1983). Various tools have been used to confirm the syndrome and all have met with criticism (Halbreich & Endicott, 1985; McFarlane, Martin & MacBeth Williams, 1988; Taylor, Fordyce & Alexander, 1991). Because of disagreement over definition and severity of symptoms needed to define the syndrome, the terms premenstrual complaint and symptomatic premenstrual change have been used interchangeably in this study.

In order to acquire reliable data it is necessary to include women who experience changes which occur in the premenstrual phase and which are absent or less prominent at other times in the menstrual cycle. It is also necessary to assess the severity of these symptoms (Abplanalp, 1983; Halbreich, Endicott & Schacht, 1982; Cumming, Fox & Cumming, 1990). The Premenstrual Assessment Form (PAF), used in this study, was developed by Halbreich, Endicott and Schacht (1982) in order to evaluate the existence and severity of premenstrual symptoms. The PAF is a self-report instrument used to evaluate physical, behavioral and mood changes that have occurred premenstrually over the previous 3 menstrual cycles.

Criticisms of retrospective reporting scales are outlined in the literature review. In order to overcome such problems as inaccurate recall, reporting of the worst rather than the average premenstrual experience, and response based on expectations, the Daily Symptom Rating Chart was included. This is a prospective scale developed by Dennerstein, Spencer-Gardner and Burrows (1984) by which women rate the severity of 10 variables over the course of the menstrual cycle. Prospective recording may also be criticized but remains the accepted standard of evaluation.

The Sociability-Irritability (STI) Test was constructed and used to assess daily levels of irritability and sociability over the menstrual cycle. The STI Test consists of two subscales, the irritability subscale and the social introversion subscale, from the Multiscore Depression Inventory (Berndt, 1983).

In order to estimate food and liquid intake over the menstrual cycle, participants were asked to record all food and liquid consumed on the Daily Food and Liquid Intake chart. This included keeping track of cravings and assessing appetite level.

Because external stressors could also have influenced the variables being examined, women were asked to record daily external events that might have influenced their ratings. Data was charted in order to visually compare the influence of external stresses with the influence of premenstrual changes on the variables being examined.

Premenstrual changes affect the lives of a number of women. Stresses on marriage, family life and work have been documented in the literature (Bancroft & Backstrom, 1985). Fluctuations in irritability and sociability can have direct impact on women's relationships with others. Controversy exists over whether changes in appetite and food consumption are real or perceived. This thesis is expected to confirm that increased irritability, appetite and food and liquid intake, and decreased levels of sociability are valid complaints of women experiencing premenstrual complaint. Confirmation of premenstrual complaints has implications for case management by physicians and psychologists.

Chapter II

Literature Review

The purpose of this research is to determine whether there are changes in levels of irritability, sociability and food and liquid intake at different phases of the menstrual cycle among women who complain of premenstrual change. Changes in mood, sense of well-being and level of food intake are among the frequently reported symptoms of women who have premenstrual syndrome. In this literature review an attempt is made to provide justification for further research on changes in irritability, sociability, food and liquid intake and appetite in the premenstrual phase as compared to other phases of the menstrual cycle. This chapter includes an overview of premenstrual syndrome including the definition and prevalence of the syndrome, a brief discussion of etiological theories and methodological problems in research, and a review of literature pertaining to the topics of irritability, sociability and food and liquid intake as related to premenstrual syndrome. Each of the topics discussed has relevance to the research design. Research questions are identified at the conclusion of the chapter.

Premenstrual Syndrome (PMS): An Overview

Although the concept of a specific syndrome related to negative changes in mood in the premenstrual phase has been present for over two millenia, Frank (1931) was the first to give a name to the syndrome. He used the term "premenstrual tension" and described the symptoms as a severe syndrome of "unrest" occurring 7 to 10 days before menstruation and with complete relief after the onset of the menstrual flow. To date there is no consensus on the definition, diagnosis and classification of premenstrual syndrome. Sutherland and Stewart (1965) describe PMS as any combination of emotional or physical symptoms which occur cyclically before menstruation and regress or disappear towards the end of menstruation. According to this definition up to 97% of women would be classified as having PMS (Lauersen, 1985). Thus some attempt to describe severity of symptoms is important. Cumming, Fox and Cumming (1990) relate the importance of differentiating women with "true PMS" from those whose symptoms are not severe enough to interfere with life, and from those for whom psychological problems may be masked as PMS. As well as symptom severity, their criteria include the nature and timing of symptoms and a comparison of menstrual cycle fluctuations to a symptomatic baseline. Reid (1985) defines premenstrual syndrome as "the cyclic recurrence, in the luteal phase of the menstrual cycle, of a combination of distressing physical, psychological, and/or behavioral changes of sufficient severity to result in deterioration of interpersonal relationships and/or interference with normal activities" (p. 5). The National Institute of Mental Health's (USA) definition is more precise in that it recommends that a diagnosis of PMS be made when the symptom intensity changes at least 30% in the premenstrual period (Anderson, Severino, Hurt & Williams, 1988). Rubinow, Hoban and Grover (1988) caution that symptoms must be confirmed in a longitudinal process. The terms "premenstrual complaint" and "symptomatic premenstrual change" have been used in this study due to lack of consensus regarding the definition of premenstrual syndrome.

Although numerous research studies are reported in the literature, large gaps still exist in the understanding of premenstrual syndrome. Some authors have suggested that there is more than one syndrome involved. Abraham (1983) defines four subgroups of premenstrual tension syndrome: PMT-A consisting of premenstrual anxiety, irritability and nervous tension; PMT-H associated with water and salt retention, abdominal bloating, breast tenderness and weight gain; PMT-C characterized by craving for sweets and increased appetite premenstrually; and PMT-D, in which symptoms include depression, withdrawal, insomnia, forgetfulness and confusion. Moos (1969) identified eight symptom clusters which include negative affect and problems with concentration, as well as 6 clusters referring to somatic symptoms. He proposed that PMS might more accurately be labelled "premenstrual syndromes". Hallman, Oreland, Edman and Schalling (1987) identified two groups of PMS patients: One with irritability as the predominant syndrome; the other with depression as the main complaint. Yuk, Jugdutt, Cumming, Fox and Cumming (1990) suggest three factors: increased well-being, physiological depression and anxiety-volatility, with the latter two having some degree of overlap. Similar findings were reported in a later study (Cumming, Cumming, Krausher & Fox, 1991), supporting the idea that there may be women who fit into two distinct groups of premenstrual symptomology. Halbreich, Endicott, Schacht and Nee (1982) identified 18 subgroups of premenstrual syndrome, not all of which are mutually exclusive, based on research using the Premenstrual Assessment Form (PAF).

Consensus as to the core features, the duration and the severity necessary for the label of PMS to be appropriate all remain unresolved. As well, the symptoms of premenstrual syndrome are common to many other medical problems. This has added to confusion over the prevalence of the syndrome. From a review of the literature, Reid and Yen (1981) suggested that up to 90% of women experience at least one symptom, with 20% to 40% reporting some mental or physical incapacitation. Stewart (1989) cited 95% of women as reporting at least one negative change. Blumenthal and Nadelson (1988) reported 30% to 80% of women as reporting premenstrual changes. Hurt et al (1992) found diagnosis of PMS varied from 14% to 45% depending on the method used to assess symptom change. Estimates of those who have symptoms severe enough to interfere with their daily routines usually range from 2% to 8% (Abplanalp, 1983; Gonzalez, 1981; Hamilton, Parry, Alagna, Blumenthal & Herz, 1984; D.E. Stewart, 1989: Woods, Most & Dery, 1982a).

Symptoms appear to increase with age from the late twenties on, however age appears to be less relative in patients with severe symptoms (Ostofsky, Keppel, Kuczmierczyk, 1988). In one study 86% of women with premenstrual syndrome reported that the symptoms became worse with age (Harrison, Endicott, Nee, Glick & Rabkin, 1989). Rouse (1978) found that older women had a greater tendency to complain of increased menstrual symptomology than did younger women. Hallman (1986) found evidence of PMS being related to age, with the highest prevalence between the ages of 25 to 38.

An increase of symptoms with age, however, has been questioned. Coppen and Kessel (1963), in a survey of 500 women between the ages of 18 to 44 did not find a correlation between prevalence or severity of premenstrual syndrome symptoms and age. Gunston (1986) concluded that

PMS did not correlate with age, parity or marital status in a sample of 100 consecutive patients at a premenstrual syndrome clinic. Metcalf, Braiden and Livesey (1992), in a study that measured symptomology in subjects 8 years after initial ratings, concluded that PMS is relatively stable across time. There was, however, individual variations and their sample of 9 women was too small to be definitive.

Although there is no agreement regarding age and severity of premenstrual syndrome, May (1976) and Parlee (1974) point out that college-age women do not have significant PMS symptomology. Thus the present research has chosen subjects between the ages of 25 and 45.

Since PMS affects a large number of women and may affect all aspects of their lives, including family life and work (Bancroft & Backstrom, 1985) it is an important area for continued research.

Etiology of Premenstrual Syndrome

The diverse range of premenstrual syndrome symptoms extend into various disciplines including psychology, medicine, sociology and physiology. This has led to a plethora of theories which attempt to explain the syndrome. The following review is not meant to be exhaustive, but instead to alert the reader to the diversity of explanations that exist, and to the lack of agreement on the etiology of premenstrual syndrome.

Biological Theories

Since the symptoms of premenstrual syndrome are only present in women with functioning ovaries and are tied chronologically to the menstrual cycle, it is logical to assume that the syndrome must be caused by a hormonal shift. Maddocks, Hahn, Moller and Reid (1986) observed that the pattern of responding was the same for irritability, depression and anxiety. Each of these was highest premenstrually and lowest in the intermenstrual phase. Magos & Studd (1984) found that the majority of women with PMS tend to show exacerbations of physical, psychological and behavioral symptomology at a similar time, and argued that this supports ovarian activity and ovulation as the primary etiology of PMS.

It has been suggested that concentration of estrogen and/or progesterone hormones is responsible for the various mood shifts many women experience. Evidence for an estrogen-progesterone imbalance or the excessive or deficient production of one or both hormones have been implicated as etiological factors in premenstrual tension (Backstrom & Cartensen, 1974; Dalton, 1984; Dennerstein, Spencer-Gardner, Brown, Smith & Burrows, 1984; Frank, 1931). For example, Steiner and Carroll (1977) have suggested that premenstrual irritability, along with anxiety and hostility, may form a separate cluster of symptoms from premenstrual depression. They suggest that the irritability/ anxiety cluster may be related to a high estrogen-progesterone ratio whereas the depression cluster may be related to a low estrogen-progesterone ratio. Cullberg (1972) found that women with a history of premenstrual irritability who took progestogen-dominant pills had significantly lower incidences of adverse psychological effects compared to women who took estrogen-dominant pills. He hypothesized that premenstrual irritability might be due to estrogen dominance around the premenstrual phase.

As well as ovarian hormone theories, imbalances in prolactin, prostoglandins and renin-angiotensin-aldosterone have been proposed (O'Brien, 1985; Reid, 1985). However, the relationship between premenstrual changes and hormonal balance remains unclear. No study has consistently linked particular premenstrual symptoms or symptom clusters with specific hormonal abnormalities (Clare, 1985) or consistently differentiated patients with PMS from those who do not have PMS (Gise, Lebovits, Paddison & Strain, 1990).

Various theories of nutritional deficiency have been postulated to explain premenstrual syndrome. These include deficiencies in Vitamins A, B, E and in magnesium. Nutritional theories related to cravings and to appetite change are covered under the 'Food Intake and Premenstrual Syndrome' section in this chapter. Although nutritional deficiency has been found to be associated with PMS it does not appear to be causal in nature (Abraham & Rumley, 1980).

Psychological Theories

It has been suggested that there is a relationship between PMS and psychological disturbance or psychiatric disorder (Clare, 1983; Coppen & Kessel, 1963; Cumming, 1987; Taylor, 1979). Hart and Russell (1986) concluded that women who complain of PMS generally have higher levels of anxiety and depression throughout the entire menstrual cycle rather than experiencing these symptoms exclusively in the premenstrual phase. They suggest that high-symptom reporters are individuals who are stressed throughout the cycle but whose tolerance and coping are overwhelmed during the premenstrual phase. The study has been criticized because the women were self-selected and because sample size was small. One control group woman who did have PMS could have affected these results (Metcalf, Livesey, Wells & Braiden, 1989).

A study by West (1989) also suggests that a large proportion of women with PMS have a premenstrual exacerbation of problems which are present throughout the cycle rather than symptomology which occurs only in the premenstrual phase. Rees (1953) however, observed that some psychologically unstable women had no premenstrual tension and, of unstable subjects who improved psychologically, not all improved with respect to premenstrual tension. Using the definition of complete relief of symptoms in the postmenstrual phase, many of the participants in these studies would not meet the criteria for premenstrual syndrome. In a study of 670 women classified as having PMS, nearly 75% did not meet criteria for mental disorder (Hurt et al, 1992). Sampson and Jenner (1977) did not find a significant relationship between psychological disturbance and premenstrual symptoms.

An improvement in symptoms in response to placebos has caused some researchers to favour the theory of psychological disturbance. Fausto-Sterling (1985) reports that women being treated for PMS respond to treatment with placebos as much as to drugs or hormones. None of the treatments for premenstrual syndrome have survived double-blind or placebo controlled studies. Smith, Cleghorn, Streiner and Younglai (1975) report evidence that premenstrual tension syndrome shows a marked placebo response with any therapy. However, the fact that symptoms are cyclic seems to discredit the theory that premenstrual syndrome is purely due to psychological problems (Greenblatt, Teran, Barfield and Bohler, 1987). Abplanalp (1983) argues that the placebo effect may occur simply because it is the first time participants have been reassured that they are not mentally ill.

Some researchers have argued that women do not experience more symptoms in the premenstrual phase, but believe that they do due to social learning or negative stereotypes surrounding menstruation. One claim is that retrospective reports of premenstrual symptomology are due to faulty information processing. Ruble and Brooks-Gunn (1979) suggest that biases in information processing may lead to negative premenstrual experience being attributed to the menstrual cycle, while positive premenstrual experiences and negative experiences during other cycles may be attributed to other factors. Ruble (1977) deceived some women into believing they were about to start menstruating while convincing others that they were not. She found an increased reporting of premenstrual symptoms for those women who believed they were premenstrual. Participants were college-age women who did not complain of premenstrual syndrome. Slade (1984), in a study using daily ratings, concluded that, with retrospective studies, many women would falsely attribute mood change to the premenstrual phase as a result of their expectations and beliefs. This study has been criticized for using only college-age women. However, results of a more recent study using 51 female hospital staff between the ages of 29 and 49 (Ainscough, 1990) suggest that many women perceive themselves as experiencing premenstrual tension, but few show evidence in daily record reporting. Ainscough attributes these results to an information processing bias towards women remembering mood changes which occur premenstrually, but forgetting or attributing to other causes symptoms which do not occur premenstrually. Although Ainscough's study sampled women of varied ages, participants were not screened for severity of premenstrual distress.

In a study of second year undergraduates, women's moods fluctuated less over the menstrual cycle than over days of the week (McFarlane et al, 1988). What women remembered and what actually happened differed. Women recalled more unpleasant moods premenstrually and more pleasant moods intermenstrually than they reported concurrently. As well, women were not found to be "moodier" than men on a day-to-day basis. A study by Wilcoxon, Schrader & Sherif (1976) revealed that the experience of stressful events accounted for more of the variance than did cycle phase for symptoms of negative mood.

McFarland, Ross and DeCourville (1989) found that women who believed that menstruation had a negative impact on their lives recalled menstrual symptoms as being worse than they had reported in a prospective daily assessment. Koeske and Koeske (1975) found that subjects displayed a clear attributional pattern which linked negative moods to the premenstruum. Gallant, Popiel, Hoffman, Chakraborty &

Hamilton (1992) found that there was not an increase in stressful events for women experiencing premenstrual syndrome, but that these women experienced their problems as more disturbing particularly during the mid-luteal and premenstrual phases. However, Gannon (1981) found no consistent relationship between attitudes about menstruation and menstrual-related symptoms.

Although many explanations for premenstrual syndrome have been put forward, no etiological explanation has found experimental support (Rubinow & Roy-Byrne, 1984). Rosen, Moghadam and Endicott (1990) hypothesize that premenstrual complaints may result from the interaction between "psychological and biological vulnerability, environmental stress, and physiological changes" (p. 53).

Methodological Problems in Premenstrual Syndrome Research

Because of the varying definitions of PMS used, analysis of research studies can be confusing. Problems encountered in research on premenstrual syndrome include: the use of self reports rather than objective psychometrically valid questionnaires, retrospective versus prospective reporting techniques, and the large number of symptoms encompassed by the syndrome. An inherent problem in premenstrual syndrome research is that no symptoms are specific only to PMS. Symptoms related to PMS are probably present in all women at some time.

Reliance on self-reported symptoms may not provide reliable data. Ruble (1977) concluded that women may exaggerate normal fluctuations during the premenstruum. In addition, only the worst period may be reported with retrospective questionnaires (Halbreich & Endicott, 1985).

A point of increasing agreement regarding the methodology used in PMS research is that retrospective reports must be confirmed by prospective daily rating. (American Psychiatric Association, 1987; Bancroft & Backstrom, 1985). Various authors report dramatic overdiagnosis of PMS with retrospective reporting (Abplanalp, Donnelly & Rose, 1979; Andersch & Hahn, 1981; Rubinow, Hoban, Roy-Byrne, Grover & Post, 1985; Steiner, Haskett & Carroll, 1980). Endicott and Halbreich (1982b) report that between 40% to 75% of women who complain of PMS do not show the defining daily pattern of marked increase in symptoms followed by a decrease in postmenstrual symptoms. As few as 20% to 50% of PMS complaints may actually be confirmed by examination (Hamilton et al, 1984). Taylor et al (1991) report that retrospective checklists over represent women with high neuroticism scores on the Eysenck Personality Inventory and under represent stable women with premenstrual complaint.

However, Magos, Brincat and Studd (1986), using a time series analysis on data from 150 women with a history of

PMS, found that retrospective reporting of premenstrual syndrome was usually confirmed by prospective reporting. This appears to be the only computer-validated study to compare rating techniques. Schilling (1981) did not find evidence of stereotypical distortion on retrospective reports. Endicott and Halbreich (1982a) report that retrospective reports are fairly accurate for women with moderate to severe symptoms, particularly if women are asked to relay their most recent experience rather than a usual experience.

Cumming, Cumming, Krausher and Fox (1991) point out several weaknesses in prospective reports including that the baseline of symptoms and definitions for change are rarely clearly defined and that the range of symptoms addressed by prospective reports is usually limited. In addition, daily recording may provide a form of behavioral intervention which may, in turn, influence symptom reporting (Bancroft & Backstrom, 1985).

Reporting symptoms over more than one month allows for the assessment of intraindividual variation within the menstrual cycle, and eliminates the possibility of symptoms that are due to other factors being accounted for by premenstrual syndrome (Tucker & Whalen, 1991). Results of research by Simpson, Shand and Nyhoz (1988) showed that a significant proportion of women who considered that they had

PMS did not develop symptoms every month. According to Green (1982) alternating months (one good and one bad) are a characteristic feature of PMS.

Thus, in any research on premenstrual syndrome, retrospective reports should be confirmed by daily rating scales. Research carried on over more than one month can confirm that symptoms are due to the premenstrual phase and not to individual fluctuations or to environmental variables. In the present research participants filled out the PAF prior to the study and completed the Daily Symptom Record Chart throughout their menstrual cycle. Information on stressful life events was also requested. Of the 20 participants, 8 agreed to complete the study for a second month.

Irritability and Premenstrual Syndrome

Irritability is one of the most frequently cited premenstrual symptoms. There are few measures of irritability and few controlled studies have been done. Woods et al (1982b) report that irritability, mood swings and depression are the most common premenstrual complaints. Dennerstein and Burrows (1979) in a review of 24 prospective studies of menstrual cycle mood fluctuations found that the majority of studies reported negative moods in the premenstrual phase, with irritability as one of the characteristic symptoms. In women who complain of premenstrual changes, irritability and mood swings were reported most commonly in the premenstruum and involved between 30% to 50% of women (Freeman, Sondheimer, Weinbaum & Rickels, 1985; Haskett, Steiner, Osmun & Carroll, 1980; Sheldrake & McCormack, 1976; Taylor, 1979; Timomen & Procope, 1971). D.E. Stewart (1989), in a study of 100 normal women, found that 73% of women complained of premenstrual irritability, which is similar to a sample of 1,083 Swedish women in which 75% rated irritability as a symptom (Andersch, Wendestam, Hahn & Ohman, 1986).

In a study of 48 nursing students, who were not screened for premenstrual changes, irritability was one of the commonest reported negative experiences with 29% of women reporting this symptom (Chaturvedi & Chandra, 1990).

An item analysis of the Menstrual Distress Questionnaire completed by 42 women with severe premenstrual tension syndrome revealed that irritability was the most highly ranked descriptor of premenstrual syndrome (Haskett, Steiner, Osmun & Carroll, 1980). Clare and Wiggins (1979), using a modified version of the Moos questionnaire found moderate to severe symptoms of irritability in over one third of women with premenstrual syndrome. Hallman, Oreland, Edman and Schalling (1987) described two groups of women who sought help for Premenstrual Syndrome - those who had irritability and/or hostility as the predominant symptom, and those who had depression as the predominant symptom. Most of the women interviewed in the Hallman et al study considered irritability to be the predominant factor. Thus it is important that, in any consideration of premenstrual syndrome, irritability be examined. Daily prospective rating techniques comparing irritability levels over the menstrual cycle appear to be lacking in existing research. The present study will, therefore, examine daily ratings of irritability to determine whether symptoms increase in the premenstrual phase, and to examine whether daily life stressors can be associated with comparable fluctuations.

Sociability and Premenstrual Syndrome

Little research has been done on the area of sociability and premenstrual syndrome. In women with premenstrual syndrome, 91% felt social functioning was affected and 97% reported that their partners were aware of premenstrual mood and behavioral changes during the premenstrual phase (Harrison, Endicott, Nee, Glick & Rabkin, 1989). As measured by the Minnesota Multiphasic Personality Inventory (MMPI) women with PMS indicated significant feelings of interpersonal oversensitivity and increased likelihood of having their feelings hurt by others in the premenstrual phase. This was interpreted to indicate increased social discomfort. There was no significant change for the control group (Chuong, Colligan, Coulam & Bergstrahl, 1988). Heilbrun and Frank (1989) compared general stress level and self-preoccupation with premenstrual symptoms. A possible conclusion of this study is that symptoms of premenstrual syndrome may enhance self-preoccupation and therefore decrease level of sociability. Giannini, Sorger, Martin and Bates (1988) concluded from their study that women suffering from premenstrual syndrome experience a decrease in their ability to perceive nonverbal facial cues, and have lowered nonverbal communication skills as compared to normal women. Bisson and Whissel (1989) reported that subjects suffering from premenstrual syndrome became more irritable and introverted, less trusting and less socially biased.

Altemus, Wexler and Boulis (1988) observed that women who experienced a greater amount of premenstrual dysphoria heard fewer positive words in the premenstrual as compared to the intermenstrual phase of their menstrual cycle. There was not a change in number of negative words perceived.

Sociability could be affected by the way one feels about oneself. An increased negative attitude towards self was found to be associated with increased premenstrual tension (Paulson, 1961). A study by Christensen and Oei (1989) suggests that women with confirmed premenstrual dysphoria make more frequent negative self-statements than control subjects. Bardwick (1976) observed higher self-esteem scores during ovulation than during other menstrual cycles. Scores on the Rotter's Locus of Control form showed that women with premenstrual syndrome became much more external in their orientation during the premenstruum, while control subjects did not show significant changes (O'Boyle, Severino & Hurt, 1988).

Although several studies suggest that women with premenstrual syndrome have difficulty with interpersonal relationships, these findings tend to be extrapolated from observations of phenomenon indirectly related to sociability. Research looking directly at sociability in the premenstrual phase needs to be undertaken in order to explore whether changes are actual or perceived. To the author's knowledge no prospective rating scales of sociability have been completed. Because of the lack of direct, prospective research measuring changes in levels of sociability over the menstrual cycle, sociability will be measured in this study.

Food and Liquid Intake and Premenstrual Syndrome

Although increase in food intake is a widely mentioned symptom, appetite disturbances associated with premenstrual syndrome have received limited attention. Changes in level of food intake have been observed across species (Czaja, 1975; Rosenblatt, Dyrenfurth, Ferin & Vandewiele, 1980).

Appetite Change

Higher levels of consumption overall have been reported premenstrually than postmenstrually (Christensen, Oei & Callan, 1989; Giannini & Jones, 1985; Smith & Sauder, 1969). Appetite change was reported as one of the most problematic physical symptoms in a study by Watkins, Williamson and Falkowski (1989).

Dalvit (1981) found that daily consumption increased by approximately 500 calories during the ten days prior to menses compared to an equal postmenstrual interval.

Wurtman, Brzezinski, Wurtman and Laferrere (1989) measured calorie and nutrient intake in 19 patients claiming to suffer from severe premenstrual syndrome. They found significant increases during the premenstrual phase, specifically in calories (an increase of approximately 500 per day), carbohydrates and fats, whereas protein intake remained stable. Intake for control subjects did not change significantly for either calorie or nutrient intake.

The results of a study of 20 women who had PMS indicated a relationship between caloric intake and severity of PMS symptoms. Women who reported more severe symptoms recorded higher caloric intake (Giannini, Price, Loiselle & Giannini, 1985). Metcalf, Livesey, Hudson and Wells (1988) found marked similarities in the "distribution patterns for individual moods and for breast discomfort, bloated feelings and food cravings" (p. 39).

Bancroft, Cook and Williamson (1988) used retrospective and prospective rating techniques to compare amount of food intake. In 72% of the women, premenstrual food cravings were confirmed. There was, however, no consistent association between food craving and mood change, either in timing or severity. Cravings most often reached their peak before negative moods peaked.

Both-Orthman, Rubinow, Hoban, Malley and Grover (1988) reported significant increases in appetite both in patients with premenstrual syndrome and in the control group. Subjects with PMS had a more "dramatic" increase in appetite than did the control group. Postmenstrually there was no significant differences in appetite between control and premenstrual subjects. Subjects with PMS were shown to be significantly more hungry as their feelings of depression increased. For the premenstrual syndrome group, increase in appetite was highly correlated with mood. Their study, however, did not distinguish between appetite and food cravings. Because food intake alone may not provide an accurate representation of appetite, participants in the present study will be asked to keep track of cravings and to rate their daily appetite level.

Results of a study of 34 women who were not screened for premenstrual syndrome (Pliner & Fleming, 1983) showed small but reliable weight increases in 71% of their sample and increased food intake in 66% during the premenstrual phase.

Controversy exists over whether there is actual or perceived weight gain during the menstrual cycle. Despite an increase in both perceived body size and "feeling of bloatedness", Faratian et al (1984) did not find a significant increase in body weight or in actual body measurements.

Related to food intake, several studies have been done on women with food-related disorders such as bulimia. Gladis and Walsh (1987) examined the relationship between phase of menstrual cycle and frequency of binge eating in 15 normal-weight women with bulimia. A modest but statistically significant premenstrual exacerbation of binge eating was demonstrated during the premenstrual phase. Binge eating tended to be most frequent in the 5 days preceding the menstrual period and least frequent in the 5 to 10 days after menses had begun. Two explanations were postulated: That the change in reproductive hormone levels produces a biological drive to eat, which would then lead to an increase in binge frequency in bulimic individuals; or that hormonal changes lead to mood changes which in turn increase the desire to binge.

Leon, Phelan and Kelly (1986) failed to find a relationship between eating behavior and menstrual cycle phase in 45 women who met diagnostic criteria for bulimia. This study was criticized for failure to control for medication (such as antidepressants or tranquillizers), and for the method of analysis. Changes were not compared relative to the individual's own average of bulimic episodes but rather to the average of binges of individuals in the group (Gladis & Walsh, 1987).

Food Preferences

In addition to the amount of food consumed, several studies have examined changes in food preference across the menstrual cycle. Bowen and Grunberg (1988) found that subjects in the premenstrual phase consumed more sweet food and rated sweet food more preferably than they did in the intermenstrual phase. There were no significant differences in mean consumption of either salty or bland food between phases. In this study ratings of other foods did not differ. Pliner and Fleming (1983) found a preference for sweet solutions during the premenstrual phase. These results support the hypothesis that taste preferences change over the menstrual cycle, and may be related to endocrinological factors.

Smith and Sauder (1969) also describe premenstrual increases in appetite and cravings for carbohydrate-rich foods for women experiencing premenstrual depression or tension. Women frequently craved chocolate during the premenstrual phase and 85% of those women also craved sweet foods. The authors suggested a hypoglycemic phenomenon to explain the results.

Thirty-seven percent of female prison or reformatory inmates, who were not screened for premenstrual syndrome, experienced cravings for sweets premenstrually, and 23% reported an increase in appetite at that time (Morton, Additon, Addison, Hunt & Sullivan, 1953).

Wurtman (1988) reported that cravings for carbohydrate-rich snacks increased during the premenstrual phase and were linked with substantial depression, fatigue, decreased work efficiency and decreased sociability. When a carbohydrate-rich meal was consumed during the premenstrual phase, PMS subjects reported feeling improvement in their dysphoria while control subjects showed no change.

The Tomelleri and Grunewald (1987) study did not support other findings that carbohydrate-high foods, including chocolate, were preferred during the premenstruum. They found that women exhibited a greater preference for chocolate foods during the menstrual flow than during the other menstrual stages, and that cravings for high-sugar, high-starch or lower carbohydrate foods were not affected by the stage of the menstrual cycle. No significant differences in reported food consumption were found among the different stages of the menstrual cycle. A weakness of this study was that it looked only at young college women. Moos (1968) found that younger women (21 and under) experienced more symptoms during the menstrual flow whereas older women (31 and over) experienced more during the premenstrual phase.

Proposed Causes of Change in Food Intake

The majority of findings support an increase in carbohydrate craving and consumption during the premenstrual phase. Several explanations have been proposed. Cravings for carbohydrates may have a physiological basis in that the synthesis of serotonin, a brain neurotransmitter, is increased during carbohydrate intake (Fernstrom & Wurtman; 1971, Wurtman, 1990). Carbohydrates may therefore be eaten for their antidepressant effects.

One of the four premenstrual tension syndrome categories identified by Abraham (1983), PMT-C, is characterized by increased appetite, cravings for sweets, headache, fatigue, fainting spells and/or palpitations. Abraham postulates that glucose intolerance might be a factor in this category.

Dalvit (1981) postulated that estrogen may be an appetite-suppressing hormone and that the change in estrogen concentration may account for the observed changes in food intake over the menstrual cycle. Alternately, Dalton and

Holton (1992) hypothesize that low progesterone levels increase premenstrual symptoms. They suggest that maintenance of a stable blood glucose level through regular starch intake may be necessary for the full utilization of progesterone.

A change in metabolism could also account for increased appetite. Solomon, Kurzer and Calloway (1982) found a variation in basal metabolic rate in the premenstrual phase. In 5 of 6 subjects studied the basal metabolic rate was 359 kilocalories per day higher prior to menstruation than it was just after ovulation.

Theories of nutrient deficiency have also been used to explain cravings. Abraham and Lubran (1981) identified lower red cell magnesium levels in PMS patients as compared to normal patients. This could explain chocolate cravings, as chocolate contains a considerable amount of magnesium. An additional reason for carbohydrate consumption could be related to Vitamin B6. A deficiency in Vitamin B6 is known to increase mood swings, irritability, fatigue and depression (M. Stewart, 1989). Abraham and Hargrove (1980) found significant improvement as compared to placebo using a high dosage of pyridoxine (Vitamin B6) whereas Stokes and Mendels (1972) reported no improvement with a low dosage. Kleijnen, Ter Riet and Knipschild (1990) in a review of the literature, concluded that there is no evidence that Vitamin

B6 is effective in treating patients with premenstrual syndrome.

Summary

Although much research has been undertaken on various aspects of premenstrual syndrome, there is still a lack of consensus regarding the etiology, treatment and even the definition of the syndrome. Problems in researching premenstrual syndrome include lack of reliability of self-reported data, inaccuracies of both retrospective and prospective questionnaires, lack of agreement as to the severity of symptoms needed to define premenstrual syndrome and the wide range of symptoms encompassed by the syndrome.

Because of the vast number of symptoms identified in relation to premenstrual syndrome, it is necessary to narrow the focus to a manageable number. The present research has addressed five variables: irritability, sociability, food intake, liquid intake and appetite level. These areas were identified due to the following apparent omissions in the literature:

1. Irritability has been reported as one of the most commonly experienced negative affect symptoms. Although a variety of studies have reported increased premenstrual irritability, these reports appear to be based solely on retrospective reports. As well, studies have not accounted for other factors that may influence mood swings, such as

illness or financial problems.

2. Direct prospective measures of sociability over the menstrual cycle appear to be lacking in research studies to date. Other factors that influence sociability have not been accounted for in the research.

3. Indications of change in caloric consumption have been undertaken (Dalvit, 1984; Wurtman et al, 1989), however changes in the measurable quantity of food has not, to the researcher's knowledge, been studied.

4. In a review of the literature, the author was unable to find research related to change in liquid intake over the menstrual cycle.

Definitions Used in Research

Several terms need to be clarified in order to implement the research questions. A normal menstrual cycle ranges from 21 to 35 days (Rouse, 1978). The phases of the menstrual cycle used in this research include the menstrual phase, the intermenstrual phase and the premenstrual phase. Because length of menstrual cycles vary, the length of menstrual phases also vary. The menstrual phase is defined as that phase which begins on day 1 of the menstrual flow and ends on the last day of menstrual flow. This time frame will vary from woman to woman. The intermenstrual (also called postmenstrual) phase encompasses the time period between the cessation of the menstrual flow and ovulation.

This is the time period during which women who complain of premenstrual symptomology should be symptom-free (O'Brien, 1985). The premenstrual phase occurs after ovulation and is the phase in which women with premenstrual change complain of symptoms which were not present in other phases of the cycle (Dalvit, 1984), or in which symptom increase is experienced (Halbreich et al, 1982). A brief overview of the menstrual cycle is presented in Appendix A.

Confusion may exist over the terms "irritability" and "sociability". In this research irritability is defined as "a state of excessive, easily provoked anger, annoyance or impatience" (p. 394) and sociability is defined as "the need or tendency to seek out companions, friends and social relationships" (p. 688, Goldenson, 1984).

Research Questions

The following research questions arise from the literature review and are addressed in this research.

1. Is there a change in the level of irritability experienced in the premenstrual phase as compared to the level of irritability experienced in the postmenstrual and intermenstrual phases of the menstrual cycle in women with premenstrual change.

2. Is there a change in the level of sociability experienced in the premenstrual phase as compared to the level of sociability experienced in the postmenstrual and

intermenstrual phases of the menstrual cycle in women with premenstrual change.

3. Is there a change in the amount of food intake in the premenstrual phase as compared to the amount of food intake in the postmenstrual and intermenstrual phases of the menstrual cycle in women with premenstrual change.

4. Is there a change in the amount of liquid intake in the premenstrual phase as compared to the amount of liquid intake in the postmenstrual and intermenstrual phases of the menstrual cycle in women with premenstrual change.

5. Is there a change in the level of appetite in the premenstrual phase as compared to the appetite level in the postmenstrual and intermenstrual phases of the menstrual cycle in women with premenstrual change.

6. Do daily life stressors influence the variables of food intake, liquid intake, appetite, sociability and irritability to the same degree that premenstrual changes influence these variables.

Chapter III

Methods and Procedures

The questions addressed in the present study centre on changes in levels of irritability, sociability, food intake, liquid intake and appetite over different phases of the menstrual cycle. Chapter III contains descriptions of the methods and procedures undertaken in order to answer the research questions. A description of the research design, the sample, the instruments, and the methods of sample selection, data collection and data analysis is included.

Research Design

A one-way analysis of variance (ANOVA) design using repeated measures was used in order to explore the relationship between the independent variables (the menstrual, intermenstrual and premenstrual cycle phases) and the dependent variables (irritability, sociability, food intake, liquid intake and appetite) for the 20 women who complained of premenstrual changes. Further one-way ANOVAs were calculated in order to determine the affect of Premenstrual Assessment Form (PAF) severity ratings on the dependent variables. A two-way ANOVA was used in order to determine the relationship between variables for the group of women who complained of premenstrual changes and the control group. In addition food intake, liquid intake, sociability and irritability were graphed for each participant in order to visually analyze patterns across the menstrual cycle. Daily life stresses reported by the individuals were included in order to compare their effect with the effect of premenstrual change. The group mean for each variable was also graphed across the menstrual cycle.

Sample

A sample of 20 women, ranging in age from 28 to 45 years with a mean age of 37.75 years participated in this research. Participants were women who complained of premenstrual changes and were solicited through advertisements in local newspapers, posters in workplaces which employ a high number of females, and through personal contact of the researcher. As well, a control group of 8 women who did not complain of premenstrual change was solicited by the researcher. Women in the control group had an age range from 30 to 43 years with a mean age of 32.25 years. The sample included women who varied in age, parity, marital status and occupation. All participants were from Edmonton and surrounding area. Women taking oral contraceptives, experiencing menopausal symptoms, or with irregular or abnormal menstrual cycles (i.e. outside the 21 to 35 day range) were not eligible for the study. Information pertaining to the menstrual cycle and to use of oral contraceptives and other drugs was obtained through telephone screening, and through information on the

Premenstrual Assessment Form (PAF) and the Demographic Questionnaire. A gynecologist was consulted regarding the effects of medication use reported by participants. Subjects were eliminated if it was felt that drug use might interfere with cyclical changes. Of the original sample of 30 women who complained of premenstrual change, three women had irregular periods and did not complete the study, two sets of data were incomplete, one set of data revealed oral contraceptive use and one set of date revealed use of medications which could affect premenstrual symptomology. Data for these subjects was excluded. In addition three sets of data were not returned. Demographic data for the 20 remaining subjects who experienced premenstrual complaint is listed in Table 1. Table 2 lists demographic data for the 8 control subjects.

Instruments

Four forms were used to collect data in this study:

1. PREMENSTRUAL ASSESSMENT FORM (PAF). Halbreich, Endicott, and Schacht, 1982.

2. Sociabilty-Irritability (STI) Test. Two subscales from the Multiscore Depression Inventory comprise this test. Berndt, 1983

3. DAILY FOOD AND LIQUID INTAKE CHART.

4. DAILY SYMPTOM RECORD CHART. Dennerstein, Spencer-Gardner & Burrows (1984).

Table 1

Demographic Data for Women With Premenstrual Complaint (N=20)

Age: Range 28-45 years
Mean 37.75 years

Marital Status: Married - 16
Single - 2
Divorced - 2

Parity: Number of Pregnancies: 0 - 4
1 - 4
2 - 5
3 - 5
4 - 2

Education: 10 - 12 years: 1
12 - 14 years: 6
15 years: 1
15+ years: 12

Occupation: Housewife - 2
Nurse - 1
Clerical - 1
Social Worker - 2
Dental Assistant - 4
Consultants - 2
Administrator - 2
Teacher - 2
Student - 1
Speech Pathologist - 1
Freelance Writer- 1
Horticulturist - 1

Table 2

Demographic Data for Women Without Premenstrual Complaint (Control)
(N=8)

Age: Range 30 - 43 years
Mean 32.25 years

Marital Status: Married - 4
Single - 3
Divorced - 1

Parity: Number of Pregnancies: 0 - 4
1 - 2
2 - 2
3 - 0
4 - 0

Education: 10 - 12 years: 0
12 - 14 years: 1
15 years: 0
15+ years: 7

Occupation: Housewife - 1
Social Worker - 1
Consultant - 4
Speech Pathologist - 1
Bookkeeper - 1

As well, a Demographic Questionnaire, a consent form and a covering letter were included in the package mailed to each participant.
(see Appendix B for sample copies of these instruments).

1. Premenstrual Assessment Form (PAF). The PAF is an instrument designed to describe self-reported psychological, behavioral and physical changes which may occur during the premenstrual period. Rubinow and Roy-Byrne (1984) rated the PAF as the best retrospective method for screening and selecting premenstrual syndrome profiles. The PAF is divided into 3 parts: identification data and general information regarding menstrual history, physical health, and special conditions; a 6-point scale rating severity of change in the areas of mood, behavior and physical condition in the premenstrual as compared to the non-premenstrual state over the past three menstrual cycles. Response choices range from 'not present at all/no change from usual' to 'extreme change'; and a brief written description of differences experienced by the participant in the premenstrual phase.

In this study the PAF was used as a screening device to ensure that participants exhibited symptomatic premenstrual change, and as a means of obtaining demographic information.

2. STI TEST. Two subscales from the Multiscore Depression Inventory (MDI), the Social Introversion subscale

Depression Inventory (MDI), the Social Introversion subscale and the Irritability subscale, were used for the purpose of this study (Berndt, 1983). These subtests were renamed the STI Test. The MDI was originally normed on a sample of normal, as opposed to clinically depressed, subjects. Internal consistencies on the MDI range from .84 to .87 for the irritability subscale and .82 to .86 for the social introversion subscale, as reported in the manual. Test-retest reliabilities were reported at .82 for the full-scale. Berndt reports that subscales are consistent over time. The STI was renormed on thirty-three undergraduate students. The correlation of extracted items with items embedded in the whole test was .84.

The 24 MDI items which relate to sociability and irritability were rated on a five-point Likert Scale. Ratings began on Day 1 of the menstrual flow and were completed on a daily basis throughout one or two menstrual cycles. Instructions were included with the test.

3. Daily Food and Liquid Intake Chart. Women were asked to measure and record food and liquid intake each day for the duration of the menstrual cycle. Intake recordings began on the first day of the menstrual flow and were recorded to the nearest 1/4 cup of food and liquid. Participants were asked to mark foods that were eaten due to strong cravings with "CR". As well, foods that were craved

but not eaten were recorded. Participants were also asked to rate their daily appetite on a 5-point scale.

Space was included for participants to record external influences (i.e. unusual or stressful events) that might influence their ratings for that day. Detailed instructions were included with this form.

4. Daily Symptom Record Chart. The Daily Symptom Record Chart was designed by Dennerstein, Spencer-Gardner and Burrows (1984) to assess fluctuations on 10 variables over the menstrual cycle. The Daily Symptom Record Chart was used, in this study, to confirm assessments of premenstrual complaint on the PAF. Women who did not experience increased symptoms premenstrually, and women who experienced symptoms throughout the menstrual cycle, were excluded.

Data Collection

Volunteers were initially contacted and screened by telephone. Those eligible for inclusion were sent a package which included a covering letter, a Demographic Questionnaire, a Premenstrual Assessment Form (PAF), 5 Daily Symptom Rating scales, 35 STI Test questionnaires, 35 Daily Food and Liquid Intake Charts, and relevant instructions. Telephone calls were made to each subject on approximately the 3rd, 10th and 20th days of their menstrual cycle in order to answer questions, and to encourage continued form were mailed to the examiner before participants began the study. Code names were used on all remaining forms in order to ensure confidentiality. Completed forms were mailed to the researcher.

Data Analysis

Amount of food intake, liquid intake and level of appetite as recorded on the Daily Food and Liquid Intake Charts was compared for each woman over three phases of the menstrual cycle. In this study data from days 1 to 4 were used to represent the menstrual phase, data from days 7 to 10 to represent the intermenstrual phase, and data from the last four days of the cycle to represent the premenstrual phase. A composite of ratings of irritability and of sociability was calculated for the menstrual, intermenstrual and premenstrual phases using the STI Likert scale. Data analysis took the form of one-way repeated measure analysis of variance to compare the difference in means over the 3 cycle phases. The independent variable was cycle phase; the dependent variables were irritability, sociability, food intake, liquid intake and appetite. Results of the experimental group were compared to those of the control group using a two-way analysis of variance. Data was analyzed using the SPSSX Statistical Package for the Social Sciences, version X. Results at the .05 level were significant.

In addition, data from the 5 variables were graphed and visually analyzed for each participant over the menstrual cycle.

Limitations of the Study

Several limitations may have affected results of this study. Volunteers are a select group and may not be representative of all women who suffer from symptomatic premenstrual change. Because volunteers were not compensated, 20 subjects participated for one month with 8 of these subjects continuing for a second month. A two-month study for all participants may have given more insight into the typical menstrual cycle in women with premenstrual change.

Although the Daily Symptom Record Chart was used to ensure that subjects experienced an increase in symptoms premenstrually, no test of psychological disturbance was included in this study. The possibility exists that women who rated themselves as having the most severe symptoms suffer from psychological problems which they attribute to premenstrual syndrome. Alternately these women may show an exacerbation of existing psychological problems during the premenstrual phase. These possibilities have been discussed in the literature (Clare, 1983; Hart & Russell, 1986; Hasket et al, 1980; Taylor, 1979; West, 1989). In order to rule out psychological disturbance which is masked as premenstrual syndrome, future research could include depression or anxiety inventories during the premenstrual and the intermenstrual phases of the menstrual cycle. For example, Chisholm, Jung, Cumming, Fox and Cumming (1987) used the State-Trait Anxiety Inventory and the IPAT Depression Scale.

Finally, there could be a problem with the objectivity of measurements used on the Daily Food and Liquid Intake Chart. It was assumed, however, that women who measured inaccurately would err in the same direction throughout the menstrual cycle.

Chapter IV

Findings and Conclusions

The research findings are reported in this chapter. Each hypothesis is re-stated, an analysis of the data pertaining to that hypothesis is outlined, and conclusions from the data analysis are presented. Where recording procedure and data analysis was one and the same, hypotheses have been grouped. Table 3 in Appendix C outlines mean ratings for all variables. Appendix C also includes graphs of daily mean changes across the menstrual cycle for the variables. In addition, graphs for each subject (included in Appendix D) are examined and conclusions presented.

Hypotheses I and II

Recording procedure and data analysis was the same for Hypotheses I and II.

Hypothesis I

Premenstrual measures of food intake will be higher than measures of food intake during the intermenstrual phase or during the menstrual phase for women who experience premenstrual change.

Hypothesis II

Premenstrual measures of liquid intake will be higher than measures of liquid intake during the intermenstrual phase or during the menstrual phase for women who experience premenstrual change.

Analysis. Subjects were asked to record food and liquid intake to the nearest 1/4 cup each day over one or two menstrual cycles. Participants recorded intake on the Daily Food and Liquid Intake Chart. Daily totals for food and for liquid intake were compiled and means were calculated for the menstrual, the intermenstrual and the premenstrual phases of the menstrual cycle for each participant. In order to test hypotheses I and II a 3 (phase) analysis of variance with repeated measures on the independent variable was performed, comparing the three cycle means. Food and liquid mean scores for the three phases are displayed graphically in Figures 1 and 2. Mean ratings for food intake, shown in Table 3, did not change significantly between the three phases, $F(2, 38) = 2.36$, $p < .11$. Based on a power of .8, a probability of .5 and an effect size of .4 the number of subjects needed in order to exclude a Type II error would be 99. A power of .8 is suggested for research done in the field where independent variables may have been influenced by extraneous factors and where control of data collection is relatively low (Cohen, 1977). A probabilty of .5 is consistent with the data analysis used in this research. An effect size of .4 was used as data collection was based on relatively untested measures. Thus future research should use 99 subjects in both the control and the symptomatic premenstrual change groups in order to ensure that no difference exists.

Subjects complaining of premenstrual change were compared to the control group using a 3 (phase) X 2 (group) analysis of variance. When examining results comparing the premenstrual change and the control groups, it should be noted that there was a significant difference in age between the two groups (see Tables 1 and 2). The main effect of group was not significant, $F(1, 26) = 0.71\text{-}2$, $p < .93$, for food intake. The group of women with premenstrual complaint did not differ from the control group in quantity of food consumed. The main effect of phase was nonsignificant, $F(2, 52) = 0.5$, $p < .61$, indicating that food intake did not vary over the menstrual, intermenstrual and premenstrual phases (see Table 3). As well, the main effect of interaction (phase X group) was not significant, $F(2, 52) = 2.28$, $p < .11$. No difference was identified between means of the symptomatic premenstrual change group and the control group over the three phases.

Table 3

Mean Response for Food Intake Over 3 Menstrual Phases

	Premenstrual Complainers	Control
Menstrual	31.90	31.50
Intermenstrual	31.55	34.50
Premenstrual	34.70	31.25
Standard Error	1.59	2.58
degrees freedom	2, 38	2, 14
Probability	< .11	< .40
Significant	No	No

Mean scores for liquid intake across the 3 menstrual cycles were not different. The mean premenstrual liquid intake score was not significantly different than the mean intermenstrual liquid intake score or the mean menstrual liquid intake score, $\underline{F}(2, 38) = 0.25$, $\underline{p} < .78$. See Table 4.

A 3 (phase) X 2 (group) analysis of variance demonstrated a significant main effect of group, $\underline{F}(1, 26) = 4.23$, $\underline{p} < .05$, for liquid intake. There was a difference between the premenstrual change and the control group in liquid intake, with the control group consuming higher quantities of liquid overall than the premenstrual change group. The researcher was able to contact 13 of the 20 original subjects in the symptomatic premenstrual change sample to ask whether they had deliberately restricted fluid intake. None of these women reported voluntarily consuming less liquid, although 2 subjects reported drinking less premenstrually due to bloating, and one subject reported feeling more thirsty and therefore drinking more in the premenstrual phase.

Although further research using larger samples is necessary to confirm the difference in liquid intake between the premenstrual complaint and the control group, this difference could be important in understanding premenstrual syndrome. Differences in liquid consumption could affect

Figure 1. Mean differences for food intake.

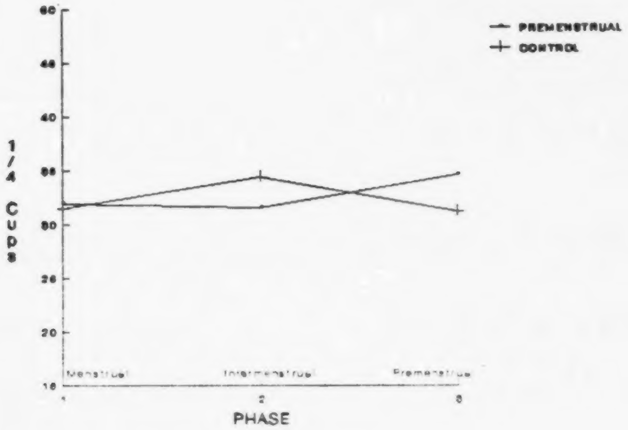
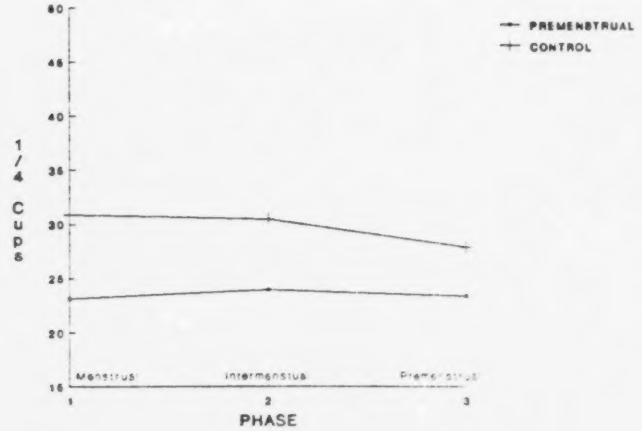


Figure 2. Mean differences for liquid intake.



the physiology of body processes, and in turn be related to premenstrual symptoms. Lower liquid intake for women in the premenstrual change group could be related to water retention throughout the month or to a difference in the way the body utilizes water.

The main effect of phase, $F(2, 52) = 1.0$, $p < .38$, was not significant for liquid intake (see Table 4). Liquid intake did not vary across phases of the menstrual cycle. The main effect of interaction (phase X group) was also nonsignificant for liquid intake, $F(2, 52) = 0.92$, $p < .4$. Differences between the three phases were not significant between the premenstrual complaint and the control groups.

Table 4

Mean Response for Liquid Intake Over 3 Menstrual Phases

	Premenstrual Complainers	Control
Menstrual	23.10	30.88
Intermenstrual	24.00	30.50
Premenstrual	23.40	27.88
Standard Error	1.31	2.08
degrees freedom	2, 38	2, 14
Probability	< .78	< .32
Significant	No	No

Conclusion. Therefore, hypotheses I and II were not confirmed. The sample of women in this study did not experience higher levels of food intake or of liquid intake in the premenstrual phase as compared to the menstrual or the intermenstrual phases. There was not a difference in food intake between the group of premenstrual complainers and the control group.

Hypothesis III

Premenstrual ratings of appetite will be higher than ratings of appetite during the intermenstrual phase or the menstrual phase for women with premenstrual complaint.

Analysis. In order to test Hypothesis III subjects were asked to rate the level of appetite they experienced each day over the course of one or two menstrual cycles. Appetite level was rated on a 5-point scale included on the Daily Food and Liquid Intake Chart. Means were calculated for each participant for the menstrual, intermenstrual and premenstrual phases of their menstrual cycle. A 3 (phase) analysis of variance with repeated measures on the independent variable was used to compare the menstrual, intermenstrual and premenstrual means for appetite. Means are graphed in Figure 3. Differences were not revealed over the 3 phases, $F(2, 38) = 1.40$, $p < .26$. See Table 5. The mean premenstrual appetite rating was not significantly different than the mean intermenstrual appetite rating or the mean menstrual appetite rating.

Figure 3. Mean differences for appetite.

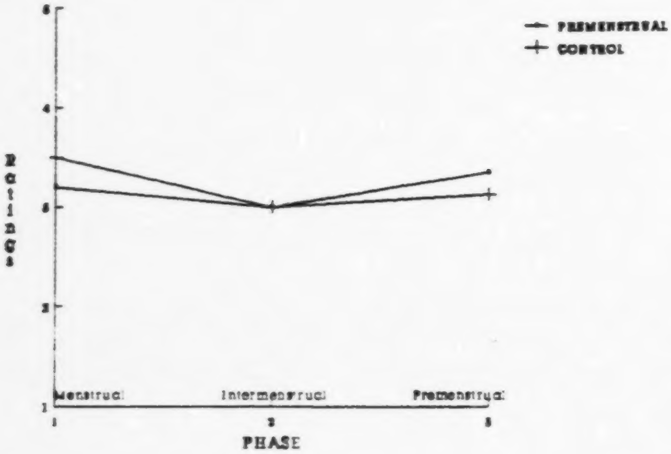


Table 5

Mean Response for Appetite Ratings Over 3 Menstrual Phases

	Premenstrual Complainers	Control
Menstrual	3.20	3.50
Intermenstrual	3.00	3.00
Premenstrual	3.35	3.13
Standard Error	0.21	0.25
degrees freedom	2, 38	2, 14
Probability	< .26	< .16
Significant	No	No

A 3 (phase) X 2 (group) analysis of variance comparing appetite means of subjects complaining of premenstrual change to those of the control group did not show significance. The main effect of the group, $F(1, 26) = .03$, $p < .87$, the main effect of phase, $F(2, 52) = 1.86, p < .17$, and the main effect of interaction (phase X group), $F(2, 52) = 1.01$ $p < .37$, was nonsignificant. Thus there was not a significant difference between the control group and the group of women complaining of premenstrual change, the three phases of the menstrual cycle were not different (see Table 5), and the interaction between group and variables was not different for appetite ratings.

Conclusion. Hypothesis III is not confirmed. The sample of women participating in this study did not experience different levels of appetite in the premenstrual phase as compared to the menstrual phase or to the intermenstrual phase of the menstrual cycle. There was not a significant difference in appetite rating between women complaining of premenstrual change and the control group.

Hypotheses IV and V

For Hypotheses IV and V, the same recording procedure and the same method of data analysis were used. Hence, they are grouped.

Hypothesis IV

Premenstrual ratings of sociability will be lower than menstrual ratings of sociability or than intermenstrual ratings of sociability for women complaining of premenstrual change.

Hypothesis V

Premenstrual ratings of irritability will be higher than menstrual ratings of irritability or than intermenstrual ratings of irritability for women complaining of premenstrual change.

Analysis. To test hypotheses IV and V daily ratings from the STI Test were totalled. Means for the menstrual, the intermenstrual and the premenstrual phases of the menstrual cycle were calculated. As with previous variables, a 3 (phase) analysis of variance with repeated measures on the independent variable was performed. Graphs of sociability and irritability means over the 3 phases are shown in Figures 4 and 5.

Differences were revealed between the means of the phases for ratings of sociability, $F(2, 38) = 12.02$, $p < .01$, as shown in Table 6.

Table 6

Mean Response for Sociability Over 3 Menstrual Phases

	Premenstrual Complainers	Control
Menstrual	40.35	47.63
Intermenstrual	46.45	48.13
Premenstrual	34.65	47.88
Standard Error	2.41	3.77
degrees freedom	2, 38	2, 14
Probability	< .01	< .99
Significant	Yes	No

The required mean difference to meet criterion significance of .05 was 6.13. Only the premenstrual versus the intermenstrual phase had an observed difference (11.80) which was greater than 6.13, as shown in Table 7.

Table 7

Mean Differences Between Cycle Phases for Sociability (Scheffe Test)

	Observed Mean Difference	Required Mean Difference	Significant
Premenstrual vs. Intermenstrual	11.80	6.13	Yes
Premenstrual vs. Menstrual	5.70	6.13	No
Menstrual vs. Intermenstrual	6.10	6.13	No

In addition, subjects complaining of premenstrual change were compared to the control group using a 3 (phase) by 2 (group) analysis of variance. These results support

Figure 4. Mean differences for sociability.

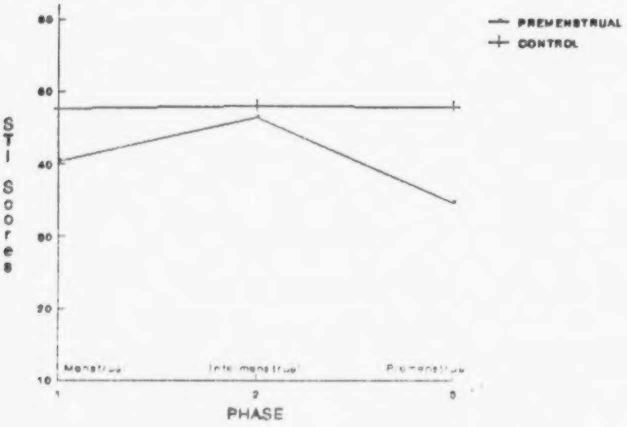
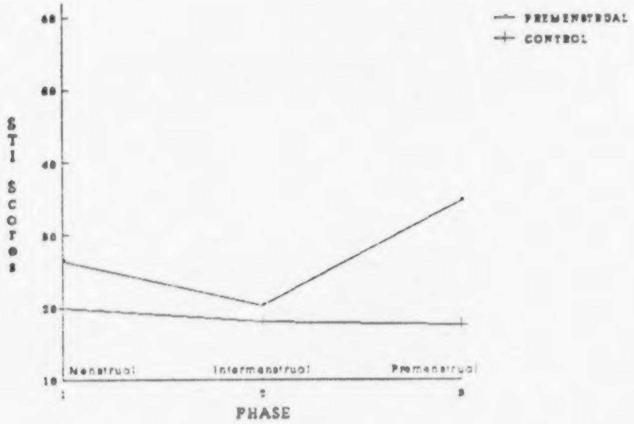


Figure 5. Mean differences for irritability.



previous findings. The main effect of group was significant for sociability ratings, F(1, 26) = 8.05, p < .01. The premenstrual change group differed significantly from the control group for ratings of sociability. The main effect of phase was also significant, F(2, 52) = 3.61, p < .03 (see Table 6). Women demonstrated different levels of sociability over the premenstrual, menstrual and intermenstrual phases of the menstrual cycle. The main effect of interaction (phase X group) was significant, F(2, 52) = 3.31, p < .04. There was a significant difference in irritability ratings between women with premenstrual complaint and the control group. Mean differences between phases were also revealed for ratings of irritability, F(2, 38) = 30.02, p <.01, as shown in Table 8.

Table 8

Mean Response for Irritability Over 3 Menstrual Phases

	Premenstrual Complainers	Control
Menstrual	26.45	19.88
Intermenstrual	20.25	18.00
Premenstrual	34.55	17.63
Standard Error	1.85	2.63
degrees freedom	2, 38	2, 14
Probability	< .01	< .67
Significant	Yes	No

The required mean difference to meet criterion significance of .05 was 4.71. Differences greater than 4.71 were observed between all three phases of the menstrual cycle for ratings of irritability. See Table 9.

Table 9

Mean Differences Between Cycle Phases for Irritability (Scheffe Test)

	Observed Mean Difference	Required Mean Difference	Significant
Premenstrual vs. Intermenstrual	14.30	4.71	Yes
Premenstrual vs. Menstrual	8.10	4.71	Yes
Menstrual vs. Intermenstrual	6.20	4.71	Yes

A 3 (phase) by 2 (group) analysis of variance comparing the premenstrual complaint to the control group confirmed previous findings. The main effect for group was significant, $\underline{F}(1, 26) = 578.13$, $\underline{p} <.01$. A large difference between the premenstrual change and the control group was evident for ratings of irritability. The main effect of phase was significant, $\underline{F}(2, 52) = 8.59$, $\underline{p} < .01$. Differences in irritability were significant between the premenstrual, intermenstrual and menstrual phases of the menstrual cycle for women with premenstrual complaint, as shown in Table 8. Finally, the main effect of interaction (group X phase) was significant for ratings of irritability, $\underline{F}(2, 52) = .00$, $\underline{p} < .01$, demonstrating that changes over the menstrual cycle phases were significantly different between the control and the premenstrual complaint groups.

Conclusion. Because mean differences for sociability were demonstrated between the premenstrual and intermenstrual phases but not between the menstrual and premenstrual phases, hypotheses IV must be rejected. The sample of women in this study experienced lower levels of sociability in the premenstrual phase as compared to the intermenstrual phase but not as compared to the menstrual phase. Figure C-4, demonstrates that mean sociability scores were low in the premenstrual phase and on the first day of the menstrual phase and then immediately increased.

Hypothesis V was confirmed. Women experienced higher levels of irritability in the premenstrual phase as compared to the menstrual or the intermenstrual phases. Differences between the sample of women complaining of premenstrual syndrome and those in the control group were significant, with no change shown by the control group.

Additional Findings

Graphs of irritability and sociability changes over each subject's menstrual cycle are included in Appendix D. Comparisons were made between premenstrual phase changes and fluctuations on days where subjects identified stressful events. Although statistical analysis of these changes was outside the realm of this study, it appears that premenstrual changes caused greater fluctuation in levels of irritability and sociability than did daily life stressors for most of the premenstrual complaint women included in this sample.

Summary of Findings

1. Higher quantities of food intake in the premenstrual phase as compared to the menstrual phase or the intermenstrual phase were not identified in the sample of women in this study. Differences between women complaining of premenstrual change and the control group were not significant.

2. Higher levels of liquid intake in the premenstrual phase as compared to the menstrual phase or the intermenstrual phase were not identified in the sample of women in this study. Liquid intake was higher for the control group than the symptomatic premenstrual change group over all phases of the menstrual cycle.

3. Ratings of appetite were not higher during the premenstrual phase than during the intermenstrual or the menstrual phases for women who experience premenstrual change. Again, the premenstrual change and the control groups did not differ significantly.

4. Premenstrual ratings of sociability were lower than intermenstrual ratings of sociability for women complaining of premenstrual change. Premenstrual ratings of sociability were not lower than menstrual ratings of sociability for the women in this sample. There was a difference in sociability ratings between the sample and the control group in the premenstrual phase of the menstrual cycle.

5. Premenstrual ratings of irritability were higher than menstrual ratings or than intermenstrual ratings of

irritability for women complaining of premenstrual change. There was a difference in irritability ratings between the sample group and the control group in the premenstrual phase of the menstrual cycle.

6. Visual analysis of fluctuations in irritability and sociability over the menstrual cycle for each individual led to the conclusion that premenstrual changes cause more fluctuation than do daily life stressors in levels of irritability and sociability. This was a visual analysis rather than a statistical finding, and should therefore be interpreted cautiously.

Summary of Hypotheses

Hypotheses I, II and III were not confirmed. Higher levels of food intake, liquid intake and appetite in the premenstrual phase were not characteristic in the sample of women in this study.

Hypotheses IV was partially confirmed. Subjects who complained of premenstrual change in this study experienced lower levels of sociability in the premenstrual phase as compared to the intermenstrual phase. Women did not experience lower levels of sociability in the premenstrual as compared to the menstrual phase of the cycle.

Hypothesis V was confirmed. Women experienced higher levels of irritability during the premenstrual phase than either the menstrual or intermenstrual phases of the menstrual cycle. As well, women who complained of premenstrual change experienced a significant change in premenstrual levels of sociability and irritability, whereas women in the control group did not. Changes in irritability and sociability appear to be affected more by premenstrual changes than by daily life stressors, based on visual analysis of participants' cycles (depicted graphically in Appendix D).

Chapter V

Discussion and Implications

The present study is a comparison of 5 variables over three stages of the menstrual cycle for women who experience premenstrual complaint. Unexpected findings and results that require further comment are examined in this chapter.

The sample for this study was composed of women from the community who complained of premenstrual change. Women were healthy, had regular menstrual cycles, were not using oral contraceptives or other medications that might influence normal cyclical variation, and were of reproductive age (between the ages of 25 and 45).

This research demonstrated changes in sociability and irritability levels over the menstrual cycle. The most significant change was an increase in irritability ratings during the premenstrual phase as compared to the intermenstrual phase. This confirms other studies which have cited irritability as a primary premenstrual complaint (Andersch et al, 1986; Haskett et al, 1980; D.E. Stewart, 1989; Woods et al, 1982b). Sociability was shown to be lower in the premenstrual phase than in the intermenstrual phase but not than in the menstrual phase. It has been reported that premenstrual symptoms disappear gradually rather than immediately after the onset of menstruation (Dalton, 1984; Tucker & Whalen, 1991). This appears to be the case for some women in this sample. Visual inspection of the individual fluctuations, especially for ratings of sociability and irritability, support the idea that symptoms decrease gradually (see Appendix D).

Food intake did not change across the phases of the menstrual cycle for either the symptomatic premenstrual change or the control group. An increase was expected in the premenstrual phase. Dalvit (1981) and Wurtman et al (1989), both using small samples, identified an increase of approximately 500 calories during the premenstrual phase. Pliner and Fleming (1983) found small but significant increases in food intake in two-thirds of the women they sampled. Because the researcher for this study looked at quantifiable measures of food rather than at type of food or calorie content, it does not rule out previous findings of higher calorie consumption and/or consumption of different types of food in the premenstruum. Research indicates that women tend to consume more carbohydrates premenstrually (Bowen & Grunberg, 1988; Smith & Sauder, 1969; Wurtman, 1988).

Many of the women in this sample identified increased hunger and cravings for rich, salty or sweet foods as a premenstrual symptom on the PAF. Other studies have identified increased premenstrual appetite (Both-Orthman et al, 1988; Watkins, Williamson & Falkowski, 1989). Although an increase was shown, premenstrual increases in appetite were not significant in this study. The intermenstrual and premenstrual differences shown in Figure 3 (Chapter 4) may have been significant with a larger sample, or with a more sensitive rating scale. Again, further research needs to be undertaken to confirm or refute this theory.

Mean food intake and appetite ratings did not increase premenstrually for this sample, however for some individuals significant increases were noted. Thus complaints of increased food consumption should not be dismissed.

No studies, to the researcher's knowledge, have looked at liquid intake. For this sample liquid intake was constant across all phases. As with food intake, a breakdown of liquid consumption might reveal intake of more calorie-laden or carbohydrate-rich liquids during the premenstrual phase. It appears that feelings of bloatedness, an oft-mentioned symptom on the PAF and the Daily Symptom Record Chart, are not due to an increase in liquid consumption. There was a difference in liquid intake between the premenstrual complaint and the control group in this sample, with the control group consuming higher quantities of liquid over all phases. Further research on this finding could provide insight into premenstrual syndrome.

A visual evaluation of cyclic changes for each subject revealed that daily life stresses had less of an impact on sociability and irritability ratings for most of the women in this sample. This is in contrast to Wilcoxon et al's (1976) findings, which revealed that stressful events accounted for more variance than did cycle phase for negative symptoms. Further research, using statistical analysis, is needed to resolve this discrepancy.

Summary

The results indicate that women who report premenstrual change experience higher levels of irritability in the premenstrual as compared to the intermenstrual phase and lower levels of sociability in the premenstrual and the menstrual phases as compared to the intermenstrual phase. Levels of food intake, liquid intake and appetite did not change appreciably between phases even though women reported feeling hungrier and craving various foods on the PAF. The participants in the study were healthy women who reported functioning normally except during the premenstrual phase.

Implications

The findings of increased irritability and decreased sociability in the premenstrual phase for women complaining of premenstrual change have implications for physicians, counsellors, families and friends of women who experience premenstrual change. Acknowledgement that premenstrual changes are real and do interfere with various aspects of normal life can assist those in the helping and medical professions when planning management strategies.

Implications for Counselling

An increase in irritability and a decrease in sociability during the premenstrual phase affect all areas of interpersonal interaction. Reference has been made to impaired marital satisfaction (Clare, 1983; Shabanah, 1963), decreased satisfaction with self (Dennerstein, Morse &

Varnavides, 1988; Mohan & Chopra, 1986; Taylor, 1979), and lower satisfaction with work-related activities (Bancroft & Backstrom, 1985; Dalton, 1984; Parker, 1960). Negative self-image during the premenstrual phase has implications for counselling. An initial step in counselling could be in helping women to accept premenstrual limitations. Prospective daily reporting charts completed over several months can help to validate the syndrome and can assist in managing symptoms. According to Gise et al (1990) making women aware of their symptoms and of how their symptoms correlate to the menstrual cycle phase seems to enhance ability to control these symptoms. Counsellors need to be aware of the complexities of the syndrome and the individual symptoms experienced by each individual. Counselling could also focus upon lifestyle changes including exercise, proper nutrition, and time management such as planning ahead to avoid stressful demands when premenstrual symptoms are at their worst. For women who have less control over time and stressful situations, like those who hold full-time jobs, other procedures could be helpful. Relaxation techniques and other methods of stress alleviation could help clients cope with premenstrual irritability. Assertiveness training could be a useful technique for women who have difficulty asking family members, employers, co-workers and/or friends for support. For women in careers which demand working with people and for their employers, awareness that increased irritability and decreased sociability are common premenstrual symptoms may lead to flexibility in the workload demand.

Because women often mention increased interpersonal problems in relation to premenstrual change, family counsellors should be aware of the impact premenstrual change can have on family life. The symptoms of higher irritability and lower sociability are especially relevant in this area. Improved communication, conflict resolution skills and self-esteem counselling are useful foci for family counsellors. Support from family members can alleviate symptoms. In addition, awareness by the therapist that the premenstrual phase may be a time of increased risk for suicide and other psychiatric problems (Davidson, 1978; Reid, 1985) can alert the counsellor to watch for related symptoms.

Implications for Education

Much misinformation and confusion regarding premenstrual syndrome exists. A wide range of target groups is apparent for education related to the syndrome. High school students, employers, physicians, psychologists, social workers, nurses and women themselves could all benefit from information regarding the syndrome. Because women do not live in a vacuum and must carry on their day-to-day activities, awareness by others of premenstrual effects is important. Education related to premenstrual syndrome, therefore, needs to be aimed at both women and men.

Premenstrual syndrome education could begin in high school health or career and lifestyle classes. There is an existing danger of causing premenstrual symptoms through creating beliefs and expectations that they will occur (Brooks-Gunn, 1979; McFarland et al, 1989). To alleviate this, awareness of positive changes such as feelings of being affectionate, happy or excited (Chaturvedi & Chandra (1990), increased sexual enjoyment and higher energy levels (D.E. Stewart, 1989) and increased productivity (Blumenthal & Nadelson, 1988) should be included.

Workshops or self-help groups which focus on lifestyle changes, support from others who experience premenstrual changes and awareness of the various treatments available for alleviating premenstrual change are helpful educational tools. For women for which lifestyle changes are ineffective, information on hormonal or other medical treatment should be made available. Although no treatment has been found to be effective for all women (Clare, 1985; Steiner & Carroll, 1977) and treatments showing improvement have met with criticism (Fausto-Sterling, 1985; Smith et al, 1975), positive effects from these treatments cannot be ruled out. A trial-and-error process may be necessary in order to identify the appropriate management plan.

Implications for Research

This research provides evidence that premenstrual changes in irritability and sociability are legitimate.

Further research on the extent of their effect on lifestyle is needed. As well, research using a controlled sample and incorporating various lifestyle techniques and/or stress alleviation procedures would be of interest to those working with clients who suffer from premenstrual complaint.

Food intake and appetite levels are conclusive as far as quantity is concerned only. Further studies analyzing quantities of types of food consumed would add depth to understanding. As well, further studies on liquid consumption in women who experience premenstrual changes may be useful in understanding premenstrual syndrome.

As refined methods of studying PMS are developed, more sophisticated research on the effects of severity on PMS level can be undertaken. The available tools do not appear to be appropriate for severity ratings.

Although daily stressful events did not visually appear to affect changes in variable level to the same extent as did premenstrual changes further research using statistical analysis is required in this area. One related direction for research, would be to monitor the effectiveness of coping skills over the phases of the menstrual cycle.

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Appendix

Appendix A

The Menstrual Cycle

Menstruation is the term used for the cyclic shedding of the lining of the uterus. This process occurs on a monthly basis in females of reproductive age. Complex processes of the hypothalamus, pituitary, ovaries and endometrium interact to cause menstruation. At birth, approximately 2 million oocytes, with follicles in various stages of development, are present in the ovary. The hypothalamic-pituitary-ovarian axis is functional in the fetus but GnRH (gonadotropin-releasing hormone) is suppressed until puberty.

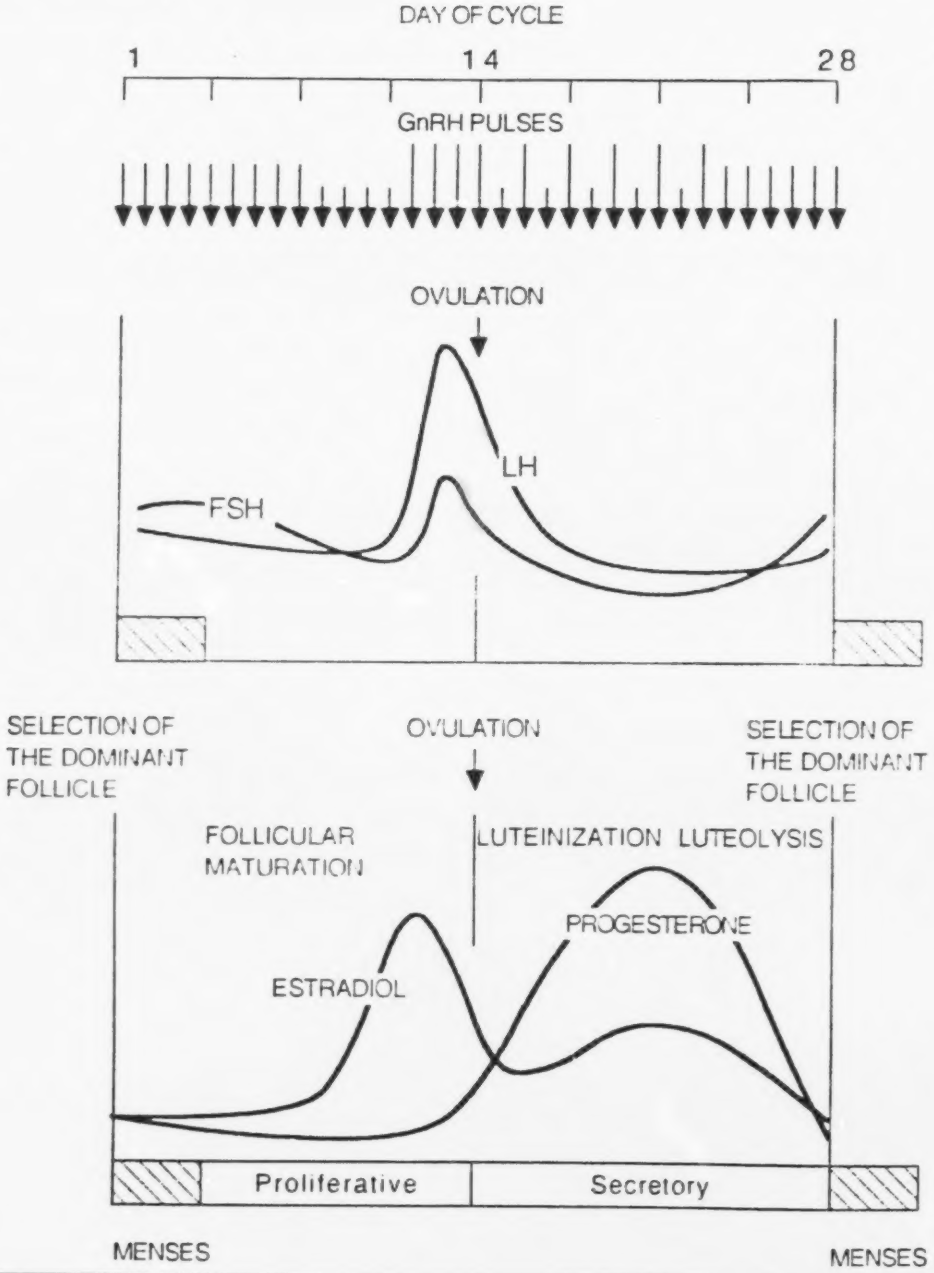
The menstrual cycle encompasses selection of the dominant follicle, maturation of the follicle, ovulation, luteinization of the follicle and luteolysis. The process of follicular selection is not clear. A single follicle develops from a cluster of previously dormant follicles in the ovary. Morphological and biochemical changes occur during the follicular phase, which is characterized by maturation of the follicle. LH (luteinizing hormone) and FSH (follicle stimulating hormone) are responsible for follicular maturation as well as for ovulation and luteinization of the follicle. Ovulation occurs midway through the cycle, when maturation of the follicle is complete. Luteinization, characterized by increased cell size, leads to increased production of progesterone and a secondary increase in estradiol (an estrogen) production.

Luteolysis refers to the degeneration of the corpus luteum. Fluctuations in circulating levels of steroid hormones (sex hormones) are responsible for the development of the endometrium. Withdrawal of the hormones leads to shedding of the uterine lining.

Figure A-1 depicts an ideal 28-day cycle. Day 1 of the cycle is that day on which the menstrual flow begins. Ovulation occurs on or near the 14th day. The length of the follicular phase varies across women with cycles longer or shorter than 28 days, while the luteal phase generally remains constant. Complaints of premenstrual change occur within the luteal phase of the menstrual cycle.

Information adapted from Cumming, 1990, pp. 169-172

Figure A-1.


DAY OF CYCLE
1
14
28
GnRH PULSES
OVULATION
LH
FSH
SELECTION OF THE DOMINANT FOLLICLE
OVULATION
SELECTION OF THE DOMINANT FOLLICLE
FOLLICULAR MATURATION
LUTEINIZATION
LUTEOLYSIS
PROGESTERONE
ESTRADIOL
Proliferative
Secretory
MENSES
MENSES

Integration of functional and hormonal events of the menstrual cycle

Appendix B

Sample of Instruments

February 7, 1992

Dear Participant,

The enclosed material in this package pertains to research related to changes in personality and behaviour over various stages of the menstrual cycle. Please fill out the Demographic survey and the Consent Form from the bottom of the Demographic survey, and mail them to the researcher (white envelope enclosed) as soon as possible. Strict confidentiality of all information will be maintained.

On the first day of your next menstrual cycle (that is, the day your menstrual flow/period starts) please begin filling out a Daily Food and Liquid Intake chart, a STI questionnaire and the appropriate column of the Daily Symptom Record Chart each day until your next menstrual flow starts. This should cover a period of approximately 30 days and should take approximately 10 minutes per day. Choose a code name to identify yourself and use that code on all Daily Food and Liquid Intake forms, all STI forms and all Daily Symptom Record Charts. The researcher will not be able to identify which forms belong to which participants. In addition, please fill out the Premenstrual Assessment Form (PAF) using your code name. At the end of your menstrual cycle please mail all materials to the researcher in the brown envelope. In the event that you want to know your information at the end of the study please keep track of your code name after sending in your package of materials. I will be sending a summary of the compiled results to all participants.

By participating in this study your are contributing to increased information in a much needed area. It is your right to withdraw from the study at any time should you feel unable to continue. I will be calling you during the next few weeks to see if you are having any problems completing the forms. Thank you for agreeing to participate. If you have any questions regarding this study please contact me at 469-1448.

Yours truly,

M. Marean

Margaret Marean,
Graduate Student, Educational Psychology

DEMOGRAPHIC QUESTIONNAIRE

Name: ____

Address: ____

Postal Code: ________________ Telephone: ________________

What is your occupation? ______________________________

Are you between 25 and 45 years of age? _________

Are you presently taking any medication? ___________. If so, describe:

Are you pregnant at this time? ___________

Are you presently using birth control pills? _________

How many children and/or pregnancies have you had? __________

How many days in your typical complete menstrual cycle? (i.e. the first day of menstrual flow until the day before your next menstrual flow? _______

Consent Form

I agree to take part in the described research study for a period covering one complete menstrual cycle. I am aware that this research is related to premenstrual syndrome and that all information will be kept confidential. I understand that I will be using a code number and that no one, including the researcher, will be aware of which information belongs to which person on the Food and Liquid Intake Chart and on the STI Test. I understand that I can choose to discontinue participation at any time.

Name: ___________________________ Date: _____________

Signature: ______________________________

STI - Test

Read the following instructions carefully before you begin.

1. Start filling out this questionnaire on the day that your menstrual flow starts. Use a separate question sheet each day to record your answers. Fill in your code number and the date at the top of each sheet.

2. Read each statement and decide how much you agree or disagree with the statement as it relates to you **today**. There are no right or wrong answers. It is important that your answers accurately reflect your feelings about each statement.

3. Answer all the statements each day.

4. 'X' only one choice for each item.

5. 'X' your answers using the following rating code.

   1 - Strongly Agree
   2 - Agree a Little
   3 - Neither Agree nor Disagree
   4 - Disagree a Little
   5 - Strongly Disagree

Example: Today, I would like to entertain guests. ✗ 2 3 4 5

If you strongly agree with the statement put an **X** over the number 1 as shown in the sample.

STI - Test

CODE NUMBER ________________ DATE ___________

1 - Strongly Agree; 2 - Agree a Little; 3 - Neither Agree nor Disagree; 4 - Disagree a Little; 5 - Strongly Disagree

'X' the appropriate number.

1. The fewer people around me today, the better I feel. 1 2 3 4 5
2. Today, I would not likely argue with people 1 2 3 4 5
3. I feel like being a loner today. 1 2 3 4 5
4. Today, I would flare up if someone crossed me 1 2 3 4 5
5. I would not mind being in crowds, today. 1 2 3 4 5
6. Today, I feel short tempered. 1 2 3 4 5
7. Today, I wish people would just leave me by myself. 1 2 3 4 5
8. I am liable to fly off the handle easily today. 1 2 3 4 5
9. Today, I feel talkative. 1 2 3 4 5
10. I have a nasty temper today. 1 2 3 4 5
11. I would avoid parties today. 1 2 3 4 5
12. Today, my blood would boil if someone upset me. 1 2 3 4 5
13. Today, I would isolate myself from my friends. 1 2 3 4 5
14. I am easily annoyed with people today. 1 2 3 4 5
15. I am a sociable and outgoing person, today. 1 2 3 4 5
16. It would be unusual for me to dislike someone today. 1 2 3 4 5
17. The more people around me, the better I would feel, today. 1 2 3 4 5
18. Today, I could be easily provoked. 1 2 3 4 5
19. I would enjoy being around people, today. 1 2 3 4 5
20. I am hot-headed today. 1 2 3 4 5
21. Today, I would like to stay to myself. 1 2 3 4 5
22. I could easily lose control of my temper, today. 1 2 3 4 5
23. Today, I would like to go somewhere away from people. 1 2 3 4 5
24. I could explode with anger and frustration today. 1 2 3 4 5

DAILY FOOD AND LIQUID INTAKE CHART - INSTRUCTIONS

Read the following instructions carefully before you begin.

1. Use a separate Daily Good and Liquid Intake Form each day to record your food and liquid intake. Fill in your code number and the date on each sheet. Start filling out the food charts on the day that your menstrual cycle starts.

2. Either at the end of each day or after each meal estimate the amount of food or liquid you have eaten to the nearest quarter of a cup.

   Some common measurements include:
   1 bowl of soup would be approximately 1 cup.
   1 piece of bread would be approximately 1 cup.
   1 banana or an apple would be approximately 1 cup.
   a small serving of rice would be 1/2 a cup.
   1 medium potato would equal approximately 1 cup.
   1 medium serving of meat would equal approximately 1 cup.
   1 can of pop would equal approximately 1 cup.
   1 slice of cheese would equal approximately 1/4 cup.
   1 handful of nuts would equal approximately 1/4 cup.

   It is important to fill out the chart every day. However, if you do miss one day please recall your intake as best you can and fill it in the next day.

3. If you have craved any goods or drinks but have not actually consumed them, please record these.

4. If anything in your day has caused an undue amount of stress and is out of the usual in your routine please record this. These events could include:

   Financial occurrences: For example, winning the lottery, getting an unexpected bill, losing an expensive piece of jewelry, etc.
   Health issues: For example, learning of a serious illness in the family, having a migraine, etc.
   Intimacy: For example, having a major fight with your spouse, your teenager walking out, etc.
   Job-Related: For example, learning that your job may be on the list of cutbacks, having an argument with a co-worker, etc.
   Other: Any event that unduly increases the amount of stress you are feeling should be recorded.

Please see the sample Daily Food and Liquid Intake Chart on the next page.

DAILY FOOD AND LIQUID INTAKE CHART

Day 1 (sample)

Please estimate food and liquid to the closest 1/4 cup.

Code Number: Munch

Today's Date: Feb. 7, 1992

Breakfast	Lunch	Supper	Snacks
Food - amt	Food - amt	Food - amt	Food - amt
1 slice toast - 1cup 1bowl cereal - 1cup	soup - 1 cup egg salad sandwich -2 1/4 cups carrots - 3/4 cup	spaghetti + meat sauce -1 3/4 cups green beans -3/4 cup salad - 1cup	handful of raisins - 1 cup apple - 1 cup potato chips - 1 cup CR
Liquid - amt	Liquid - amt	Liquid - amt	Liquid - amt
coffee - 1cup	water - 3/4 cup hot chocolate - 1 cup	milk - 1/2 cup tea - 1 cup	tea - 2cups

Please mark any foods that you ate because of a strong craving or urge with the letters 'cr'.

Please record any foods or liquids that you have craved but have not actually consumed.

None

Please circle the most appropriate description of your appetite today.

1. extremely hungry
2. somewhat hungrier than usual
[✓ 3.] normal appetite
4. somewhat less hungry than usual
5. not interest much in food today.

If applicable please record any stressful life events that occurred today.

Daughter fell + needed 3 stitches.

DAILY FOOD AND LIQUID INTAKE CHART

Day

Please estimate food and liquid to the closest 1/4 cup.

Code Number: ____________

Today's Date: _____________

Breakfast	Lunch	Supper	Snacks
Food - amt	Food - amt	Food - amt	Food - amt
Liquid - amt	Liquid - amt	Liquid - amt	Liquid - amt

Please mark any foods that you ate because of a strong craving or urge with the letters 'cr'.

Please record any foods or liquids that you have craved but have not actually consumed.

Please circle the most appropriate description of your appetite today.

1. extremely hungry
2. somewhat hungrier than usual
3. normal appetite
4. somewhat less hungry than usual
5. not interest much in food today.

If applicable please record any stressful life events that occurred today.

A DAILY SYMPTOM RECORD CHART

Week beginning: ____________________

Name: (code)

My last period started on: ____________________

Each night before retiring, please record your experience during the day of the feelings and sensations listed below. Write a number in the box opposite the item to indicate how intensely this symptom or feeling was experienced.

1	2	3	4	5
not at all	very little	moderate amount	a fair bit	a great deal

Date							
1. Restlessness							
2. Headache							
3. Breast discomfort							
4. Depression							
5. Active aggression							
6. Hot flushes							
7. Feelings of well-being							
8. Irritability							
9. Sexual thoughts or interest							
10. Swelling of abdomen, hands, legs							
Menstruation - No. of pads or tampons used.							

From Dennerstein, L., Spencer-Gardner, C., & Burrows, G. D. (1984). Mood and the menstrual cycle. *Journal of Psychiatric Research*, *18*, 1-12.

Appendix C

Mean Table and Daily Mean Graphs for Food Intake, Liquid Intake, Appetite, Sociability and Irritability

Table C-1

Mean responses for Food Intake, Liquid Intake, Appetite, Sociability and Irritability as a function of the Menstrual, Intermenstrual and Premenstrual Phases of the Menstrual Cycle.

	Phase			Group	
Measures	Mens	Intermens	Premens	PremChange	Control
FOOD	31.90	31.55	34.70	32.72	32.41
LIQUID	23.10	24.00	23.40	23.50	29.75
APPETITE	3.20	3.00	3.35	3.18	3.21
SOCIABILITY	40.35	46.45	34.65	40.48	47.88
IRRITABILITY	26.45	20.25	34.55	27.08	18.50

Figure C-1.

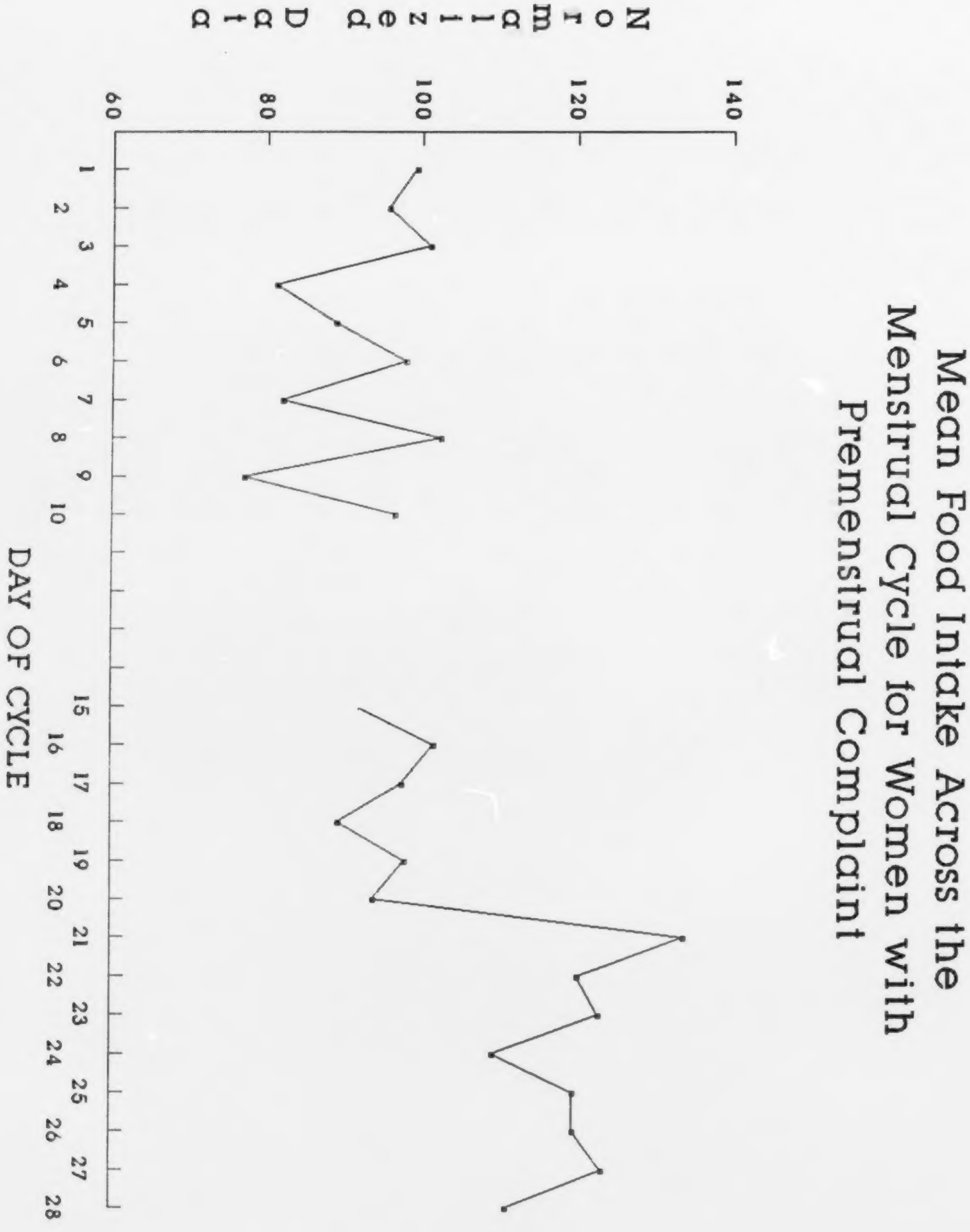

Mean Food Intake Across the Menstrual Cycle for Women with Premenstrual Complaint
Normalized Data
140
120
100
80
60
1
2
3
4
5
6
7
8
9
10
15
16
17
18
19
20
21
22
23
24
25
26
27
28
DAY OF CYCLE

Figure C-2.

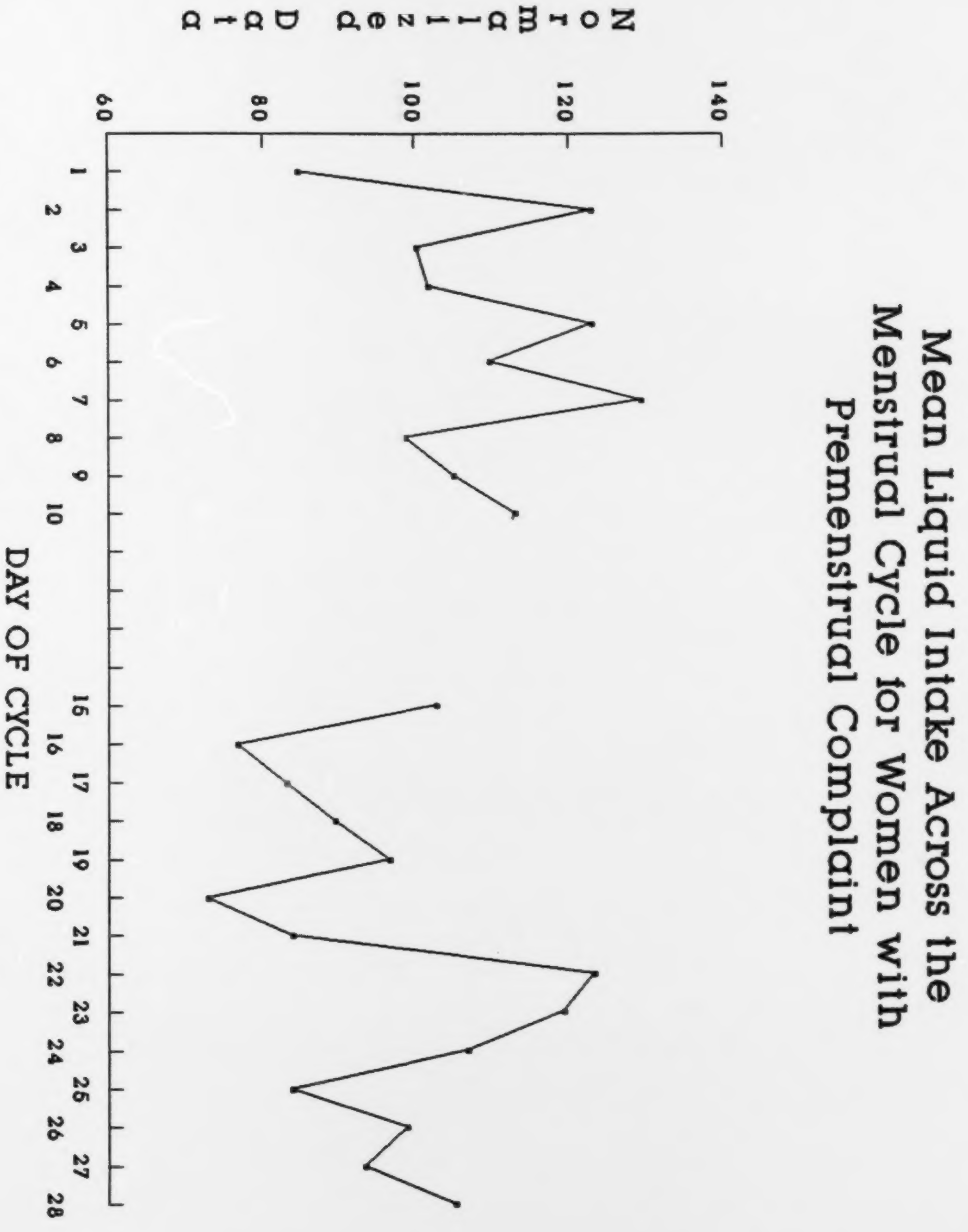
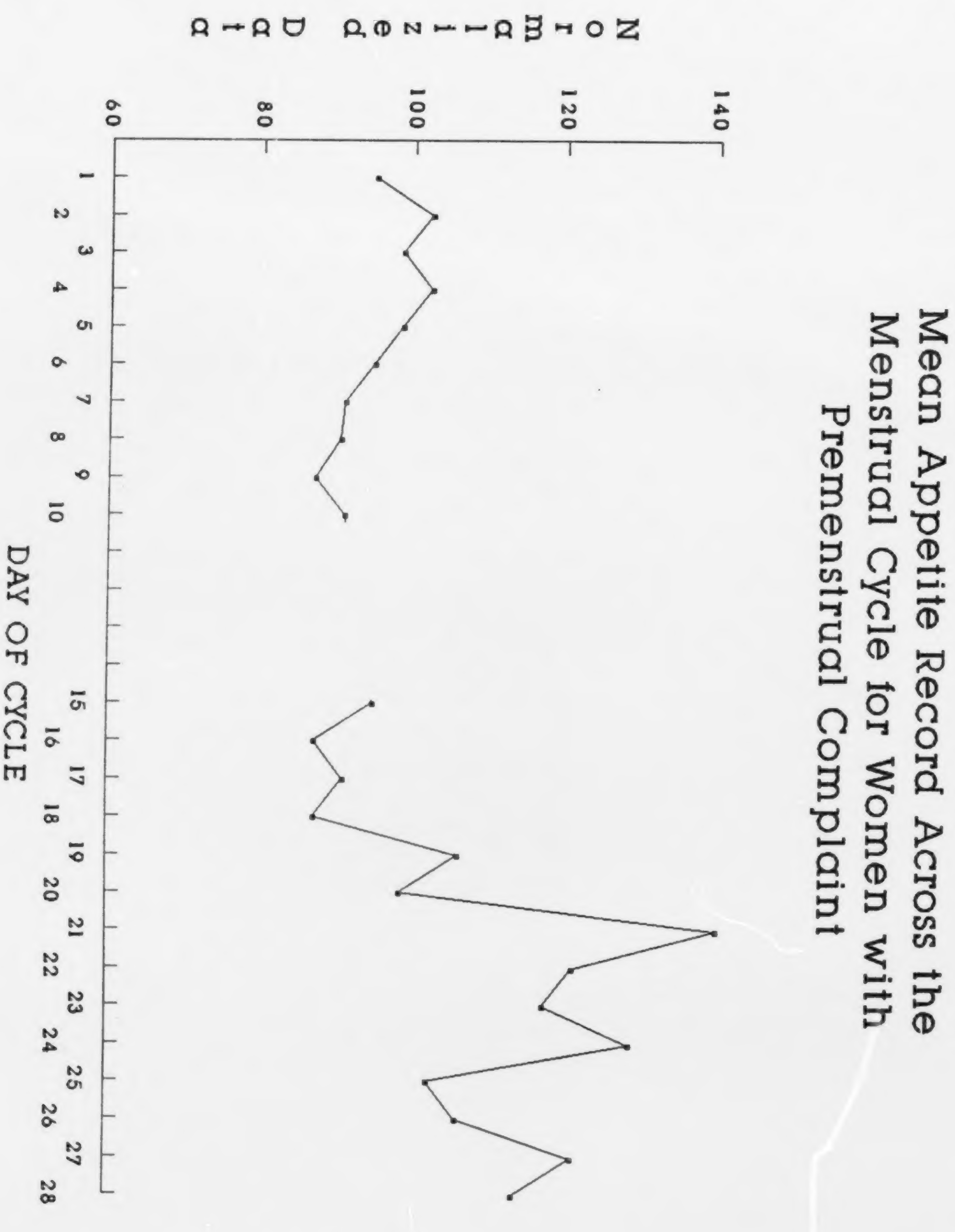
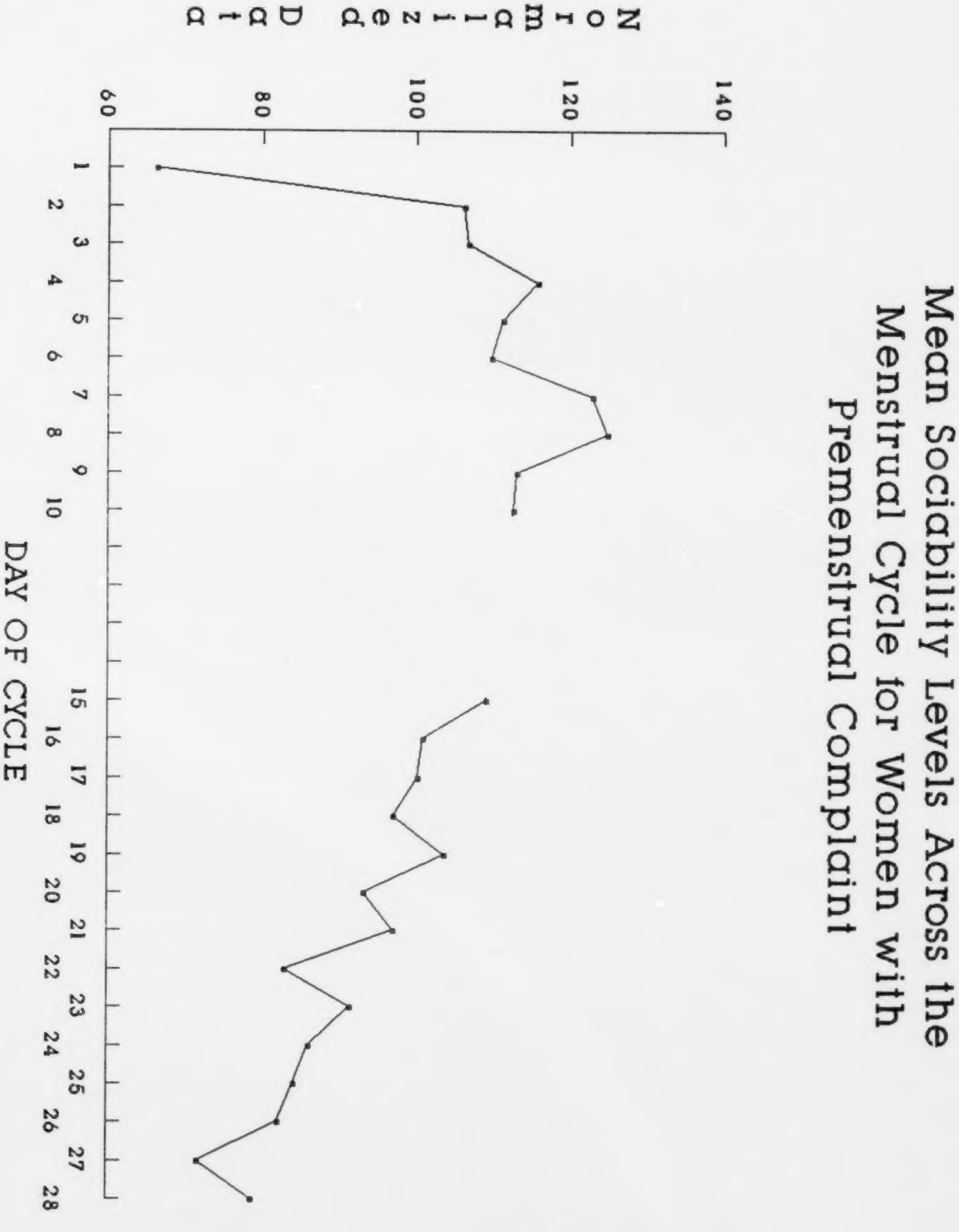

Mean Liquid Intake Across the Menstrual Cycle for Women with Premenstrual Complaint
Normalized Data
140
120
100
80
60
1
2
3
4
5
6
7
8
9
10
15
16
17
18
19
20
21
22
23
24
25
26
27
28
DAY OF CYCLE

Figure C-3.



Mean Appetite Record Across the Menstrual Cycle for Women with Premenstrual Complaint

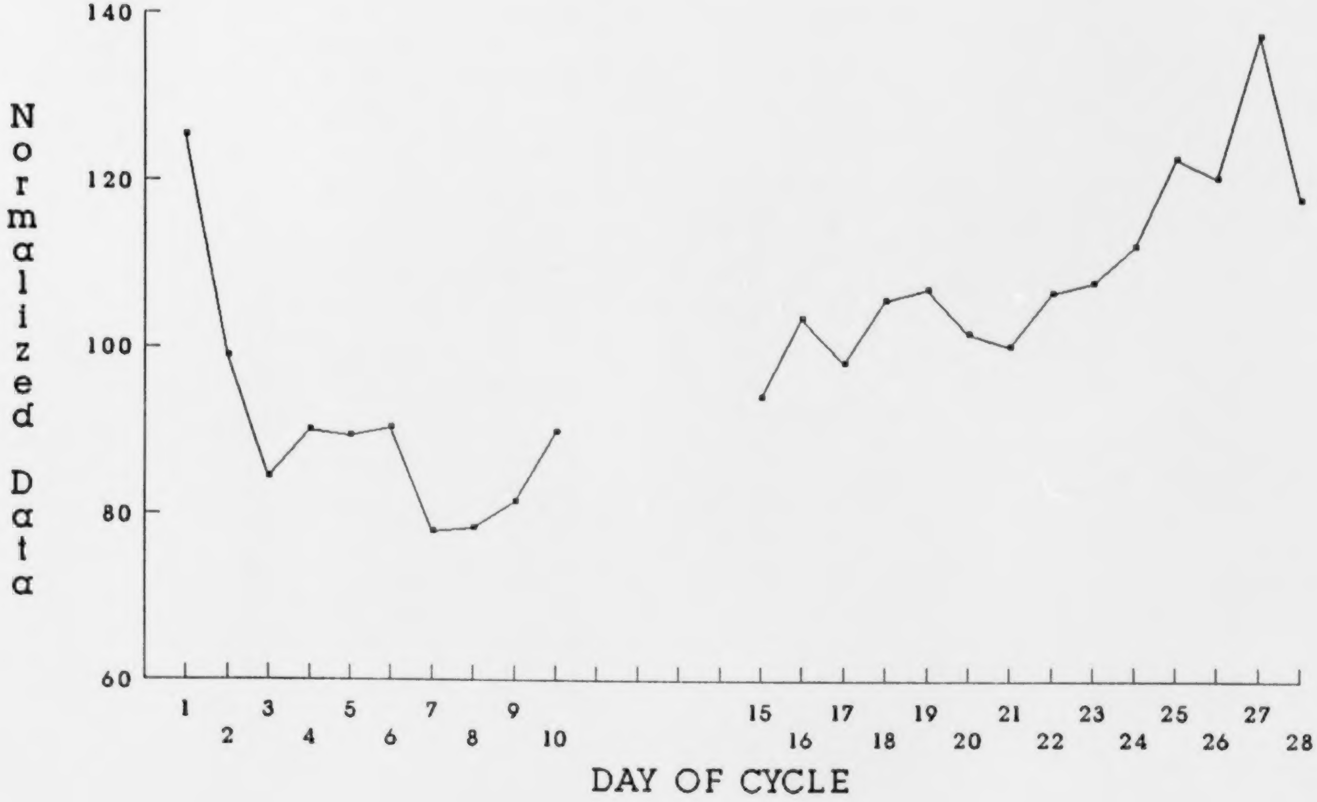
Figure C-4.



Mean Sociability Levels Across the Menstrual Cycle for Women with Premenstrual Complaint

Figure C-5.

Mean Irritability Levels Across the Premenstrual Cycle for Women with Premenstrual Complaint



Appendix D

Variable Fluctuation Across the Menstrual Cycle for Individual Subjects: Food and Liquid; Sociability and Irritability

Figure D-1.

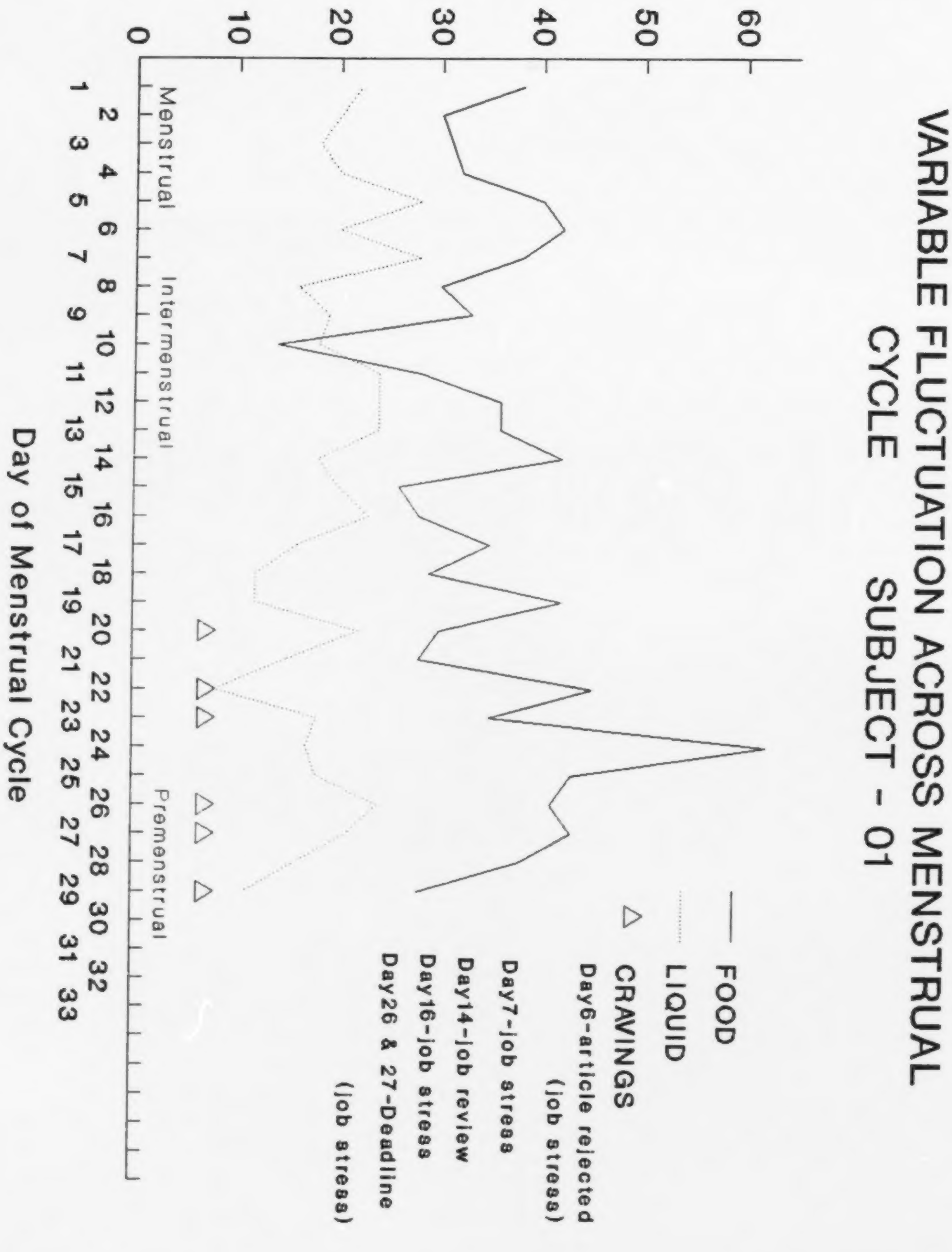

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 01
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle
Menstrual
Intermenstrual
Premenstrual
FOOD
LIQUID
CRAVINGS
Day6-article rejected (job stress)
Day7-job stress
Day14-job review
Day16-job stress
Day26 & 27-Deadline (job stress)

Figure D-2.

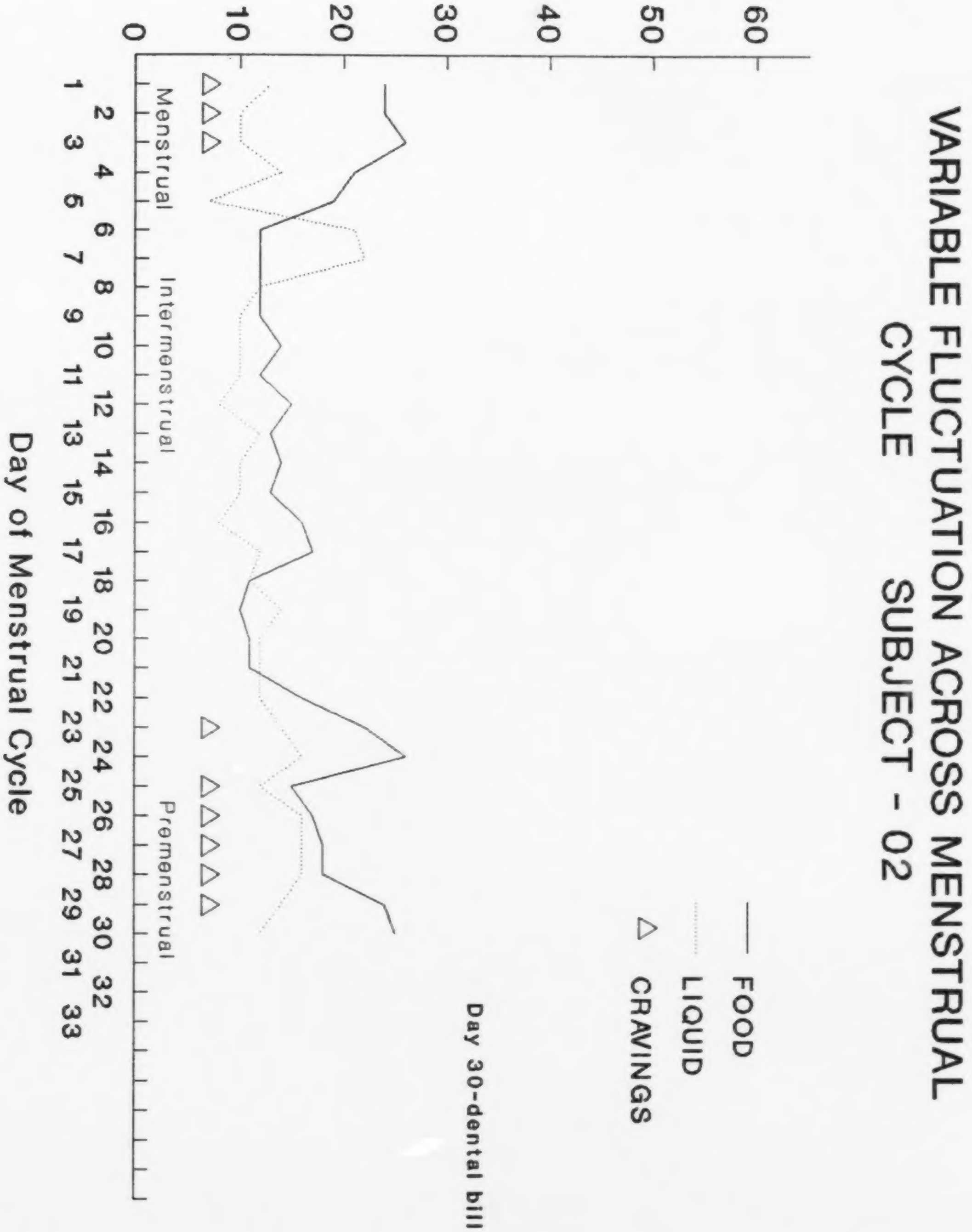

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 02
FOOD
LIQUID
△ CRAVINGS
Day 30-dental bill
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-3.

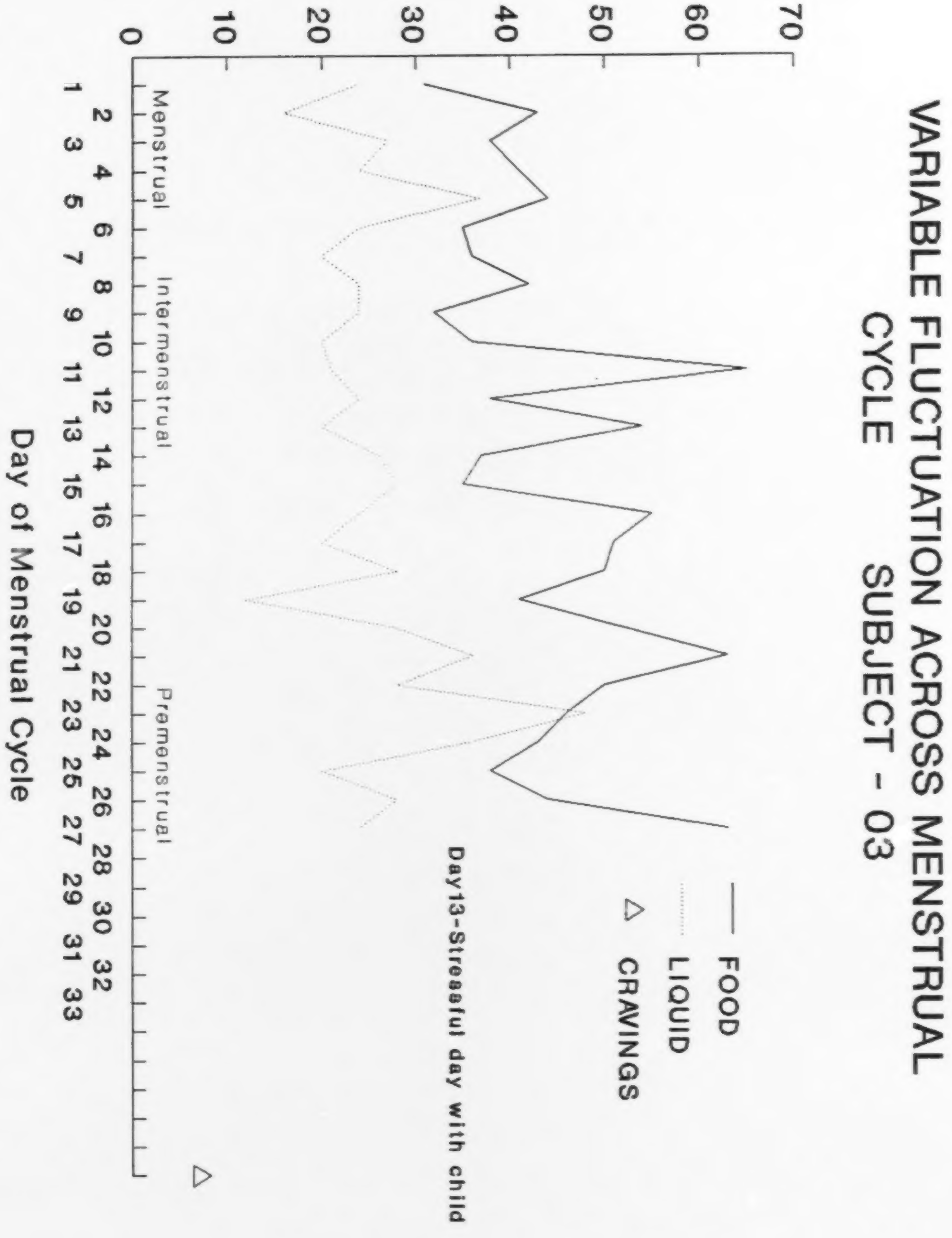

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 03
FOOD
LIQUID
CRAVINGS
Day13-Stressful day with child
0
10
20
30
40
50
60
70
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-4.

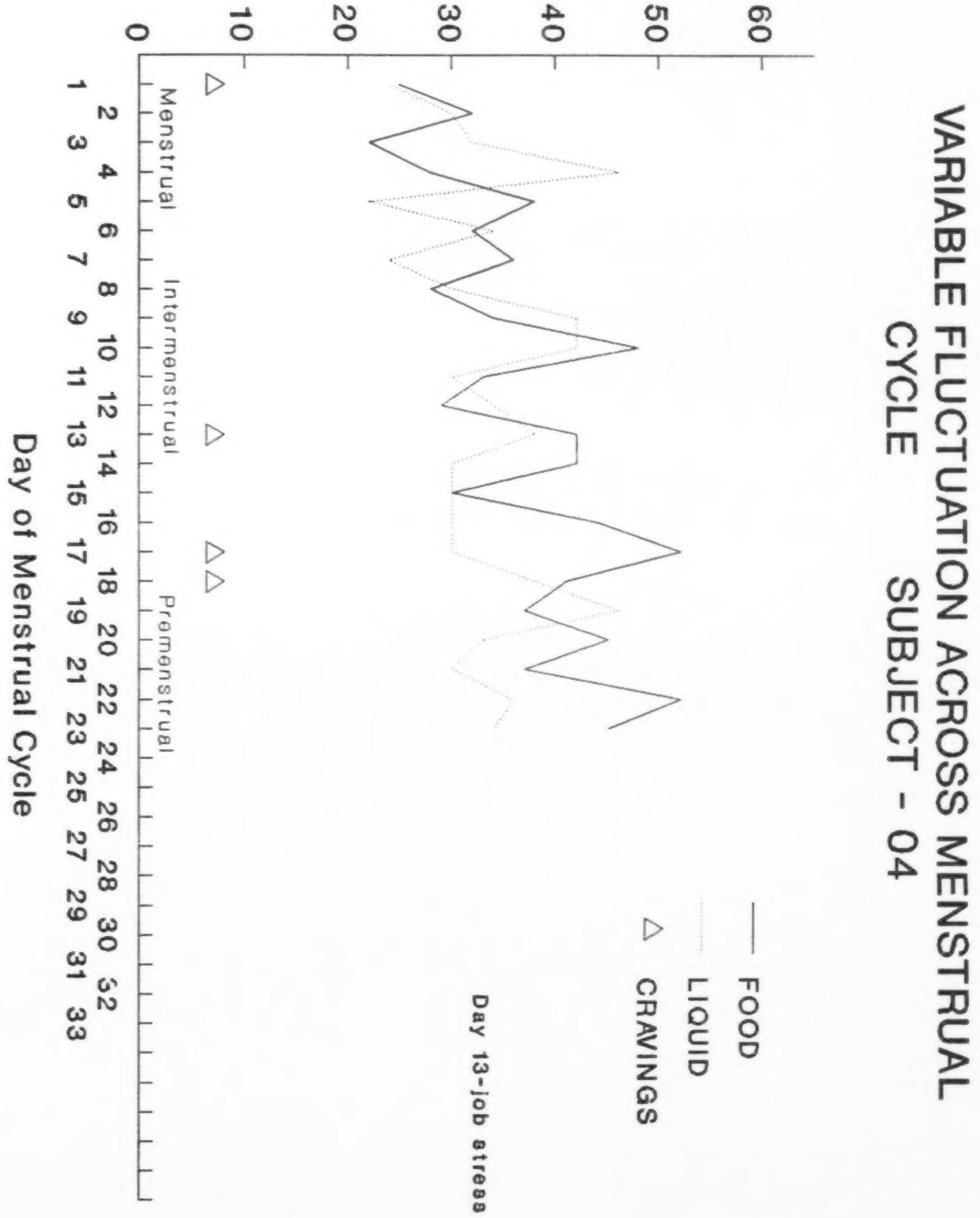

VARIABLE FLUCTUATION ACROSS MENSTRUAL
CYCLE SUBJECT - 04
FOOD
LIQUID
CRAVINGS
Day 13-job stress
0
10
20
30
40
50
60
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-5.

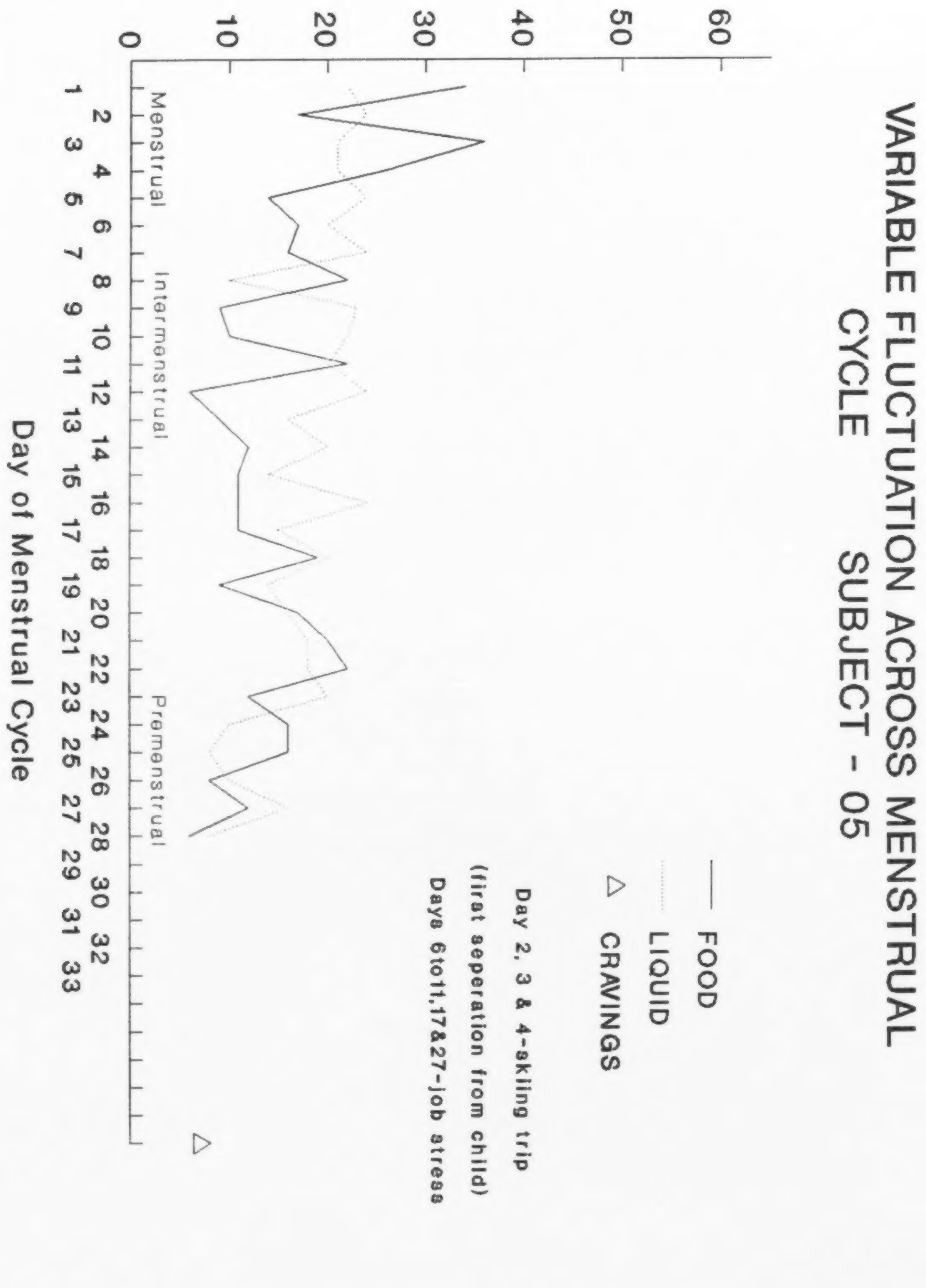

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 05
FOOD
LIQUID
△ CRAVINGS
Day 2, 3 & 4-skiing trip
(first seperation from child)
Days 6to11,17&27-job stress
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-6.

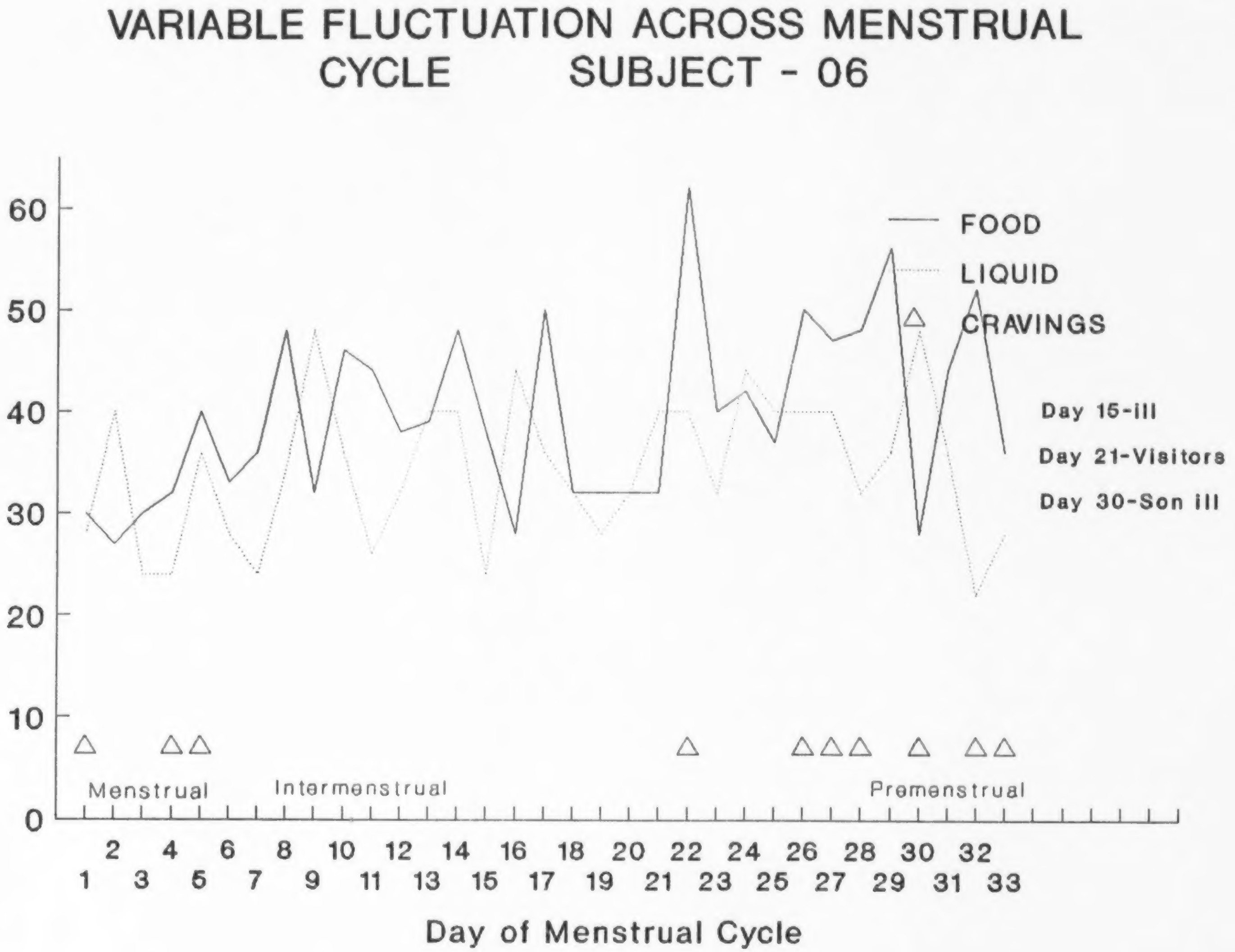

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 06
0
10
20
30
40
50
60
FOOD
LIQUID
CRAVINGS
Day 15-ill
Day 21-Visitors
Day 30-Son ill
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-7.

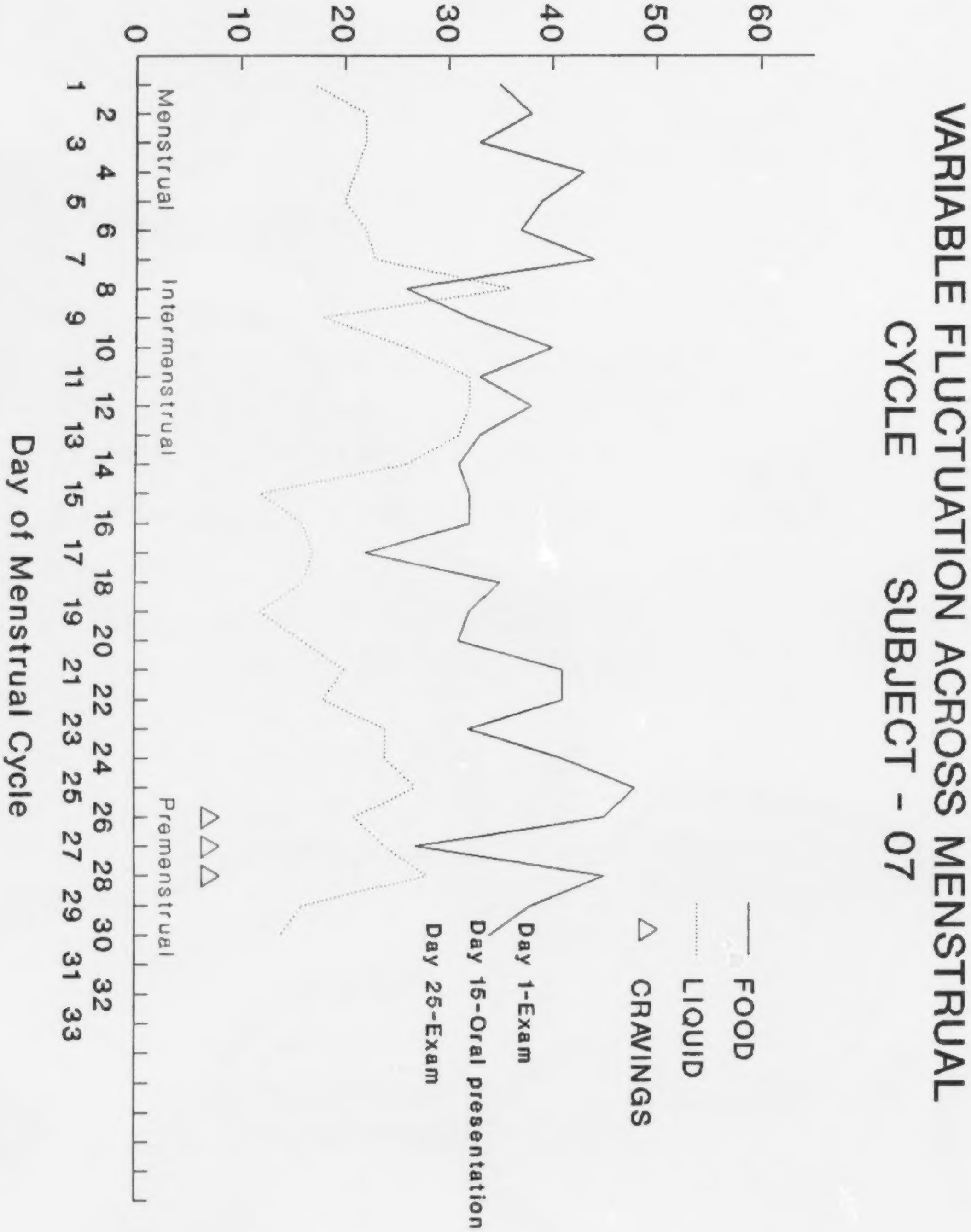

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 07
60
50
40
30
20
10
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle
Menstrual
Intermenstrual
Premenstrual
FOOD
LIQUID
△ CRAVINGS
Day 1-Exam
Day 15-Oral presentation
Day 25-Exam

Figure D-8.

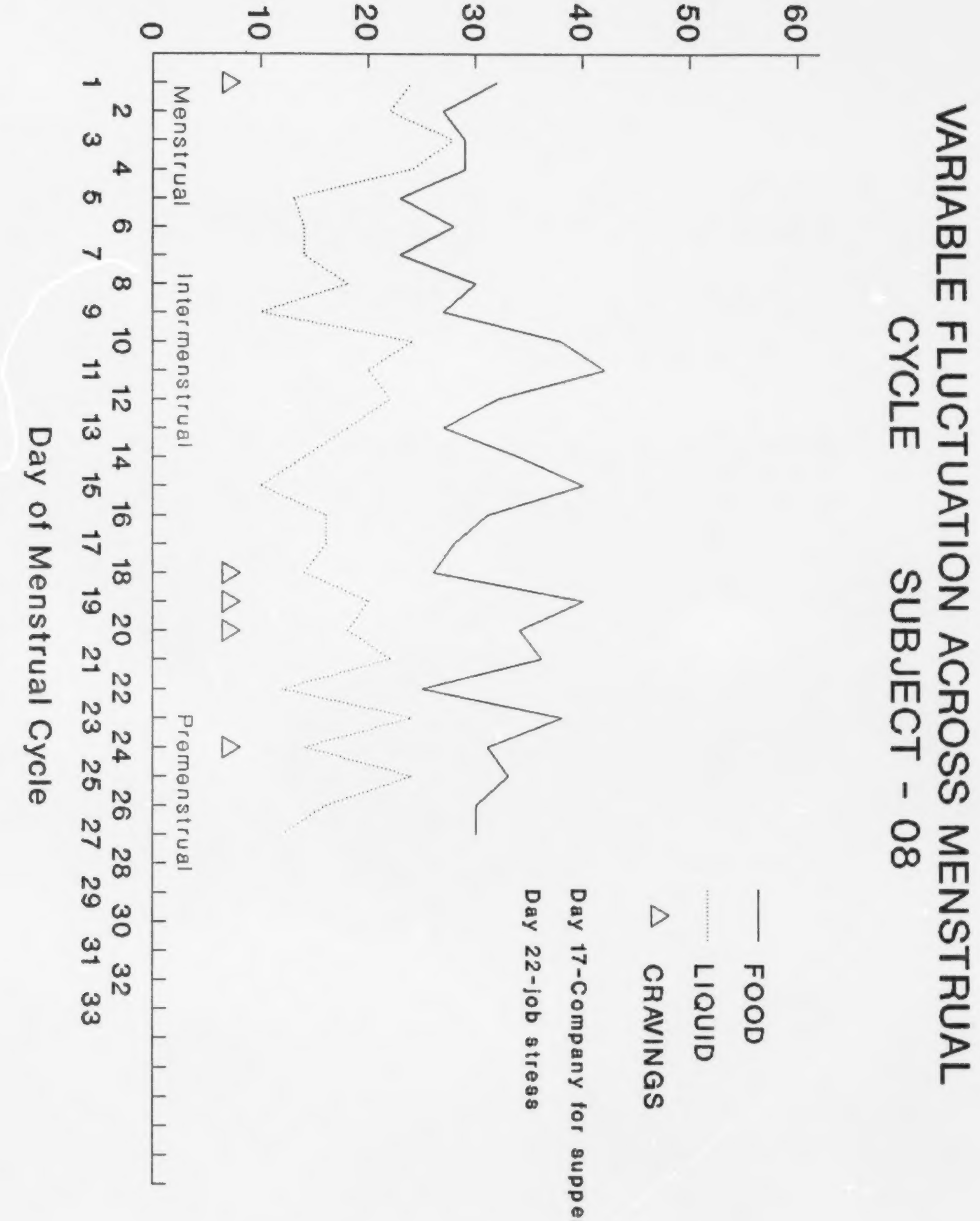

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE
SUBJECT - 08
FOOD
LIQUID
△ CRAVINGS
Day 17-Company for supper
Day 22-job stress
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-9.

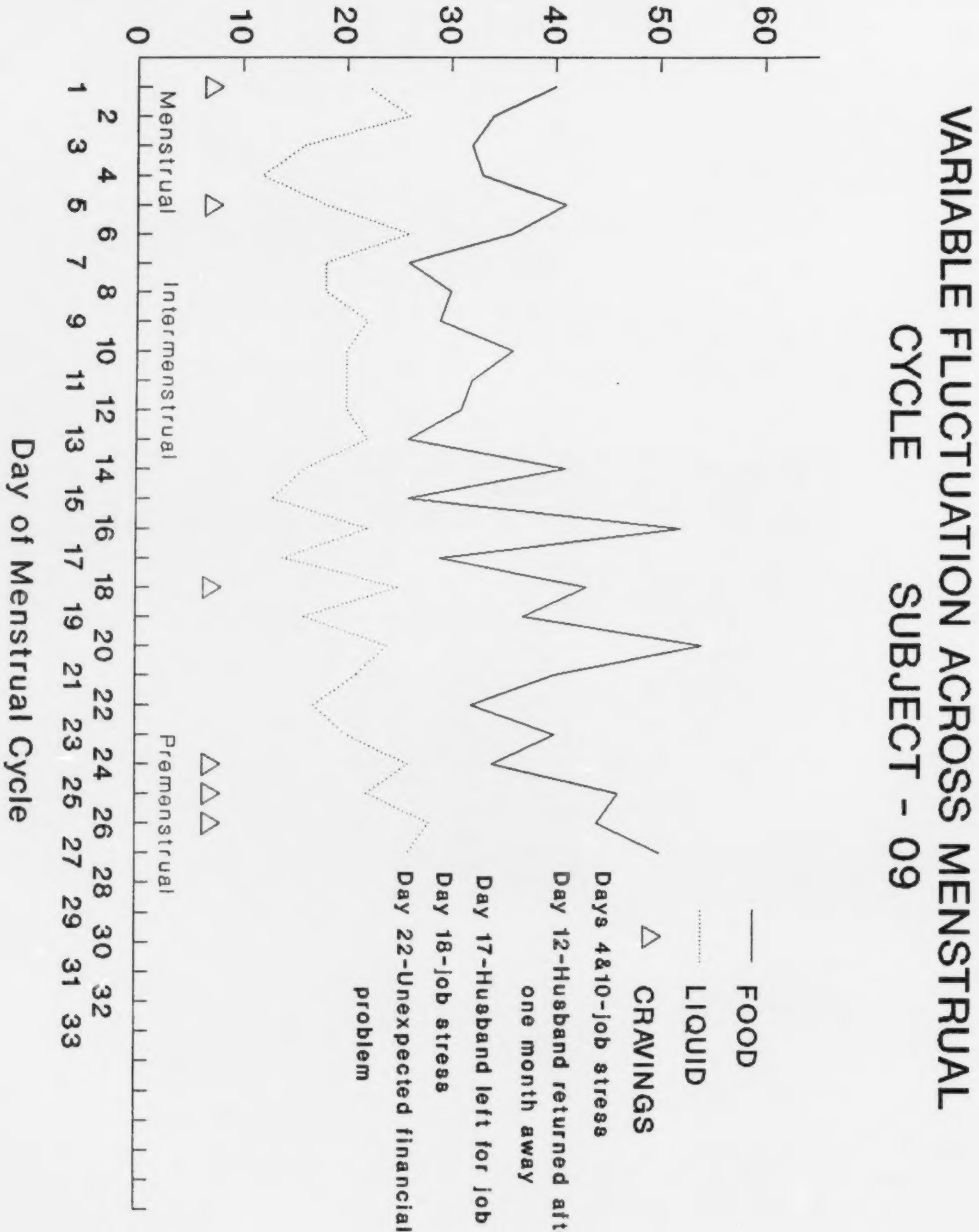

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 09
— FOOD
······ LIQUID
△ CRAVINGS
Days 4&10-job stress
Day 12-Husband returned after one month away
Day 17-Husband left for job
Day 18-job stress
Day 22-Unexpected financial problem
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-10.

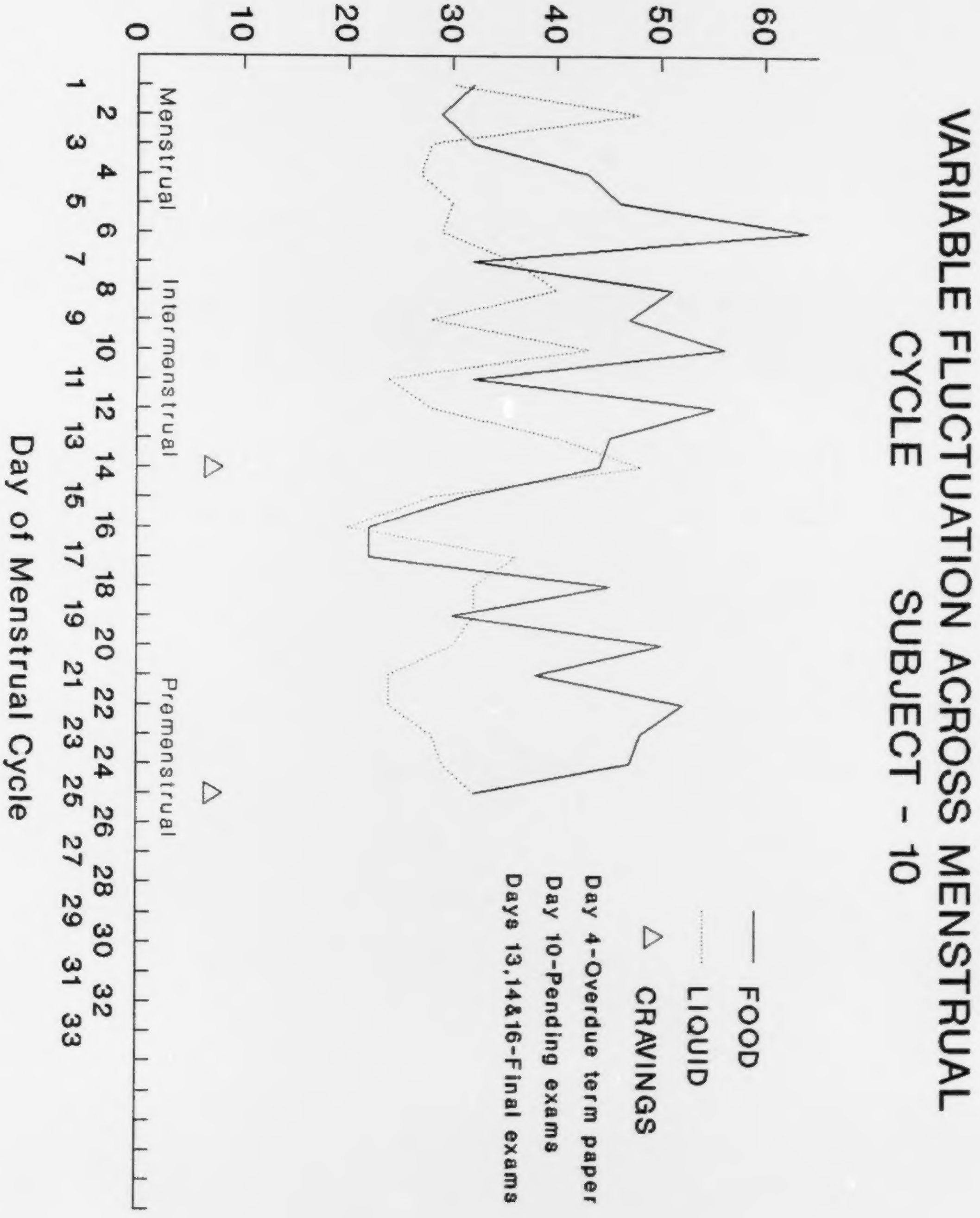

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 10
0
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle
FOOD
LIQUID
△ CRAVINGS
Day 4-Overdue term paper
Day 10-Pending exams
Days 13,14&16-Final exams

Figure D-11.

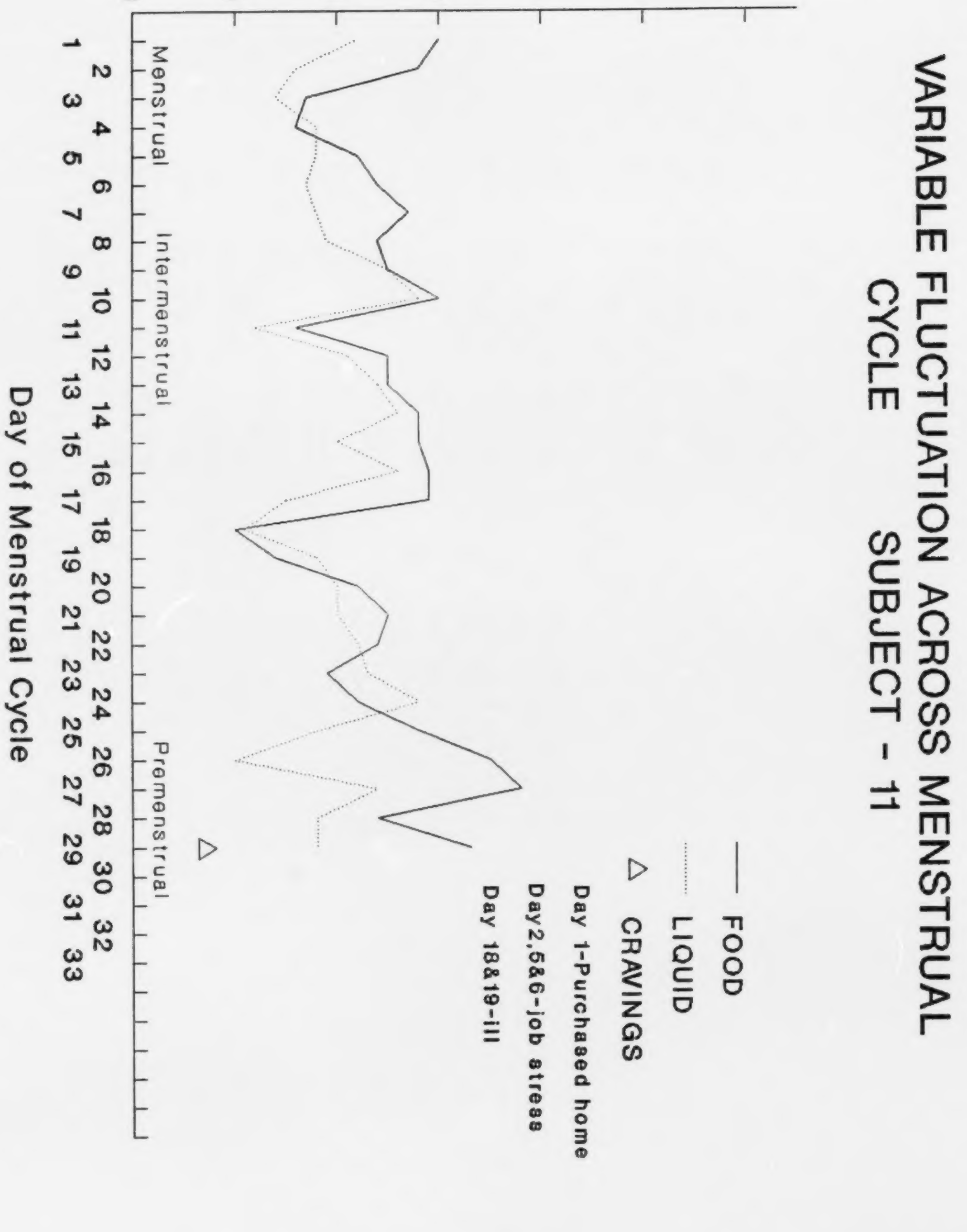

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 11
FOOD
LIQUID
CRAVINGS
Day 1-Purchased home
Day2,5&6-job stress
Day 18&19-ill
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-12.

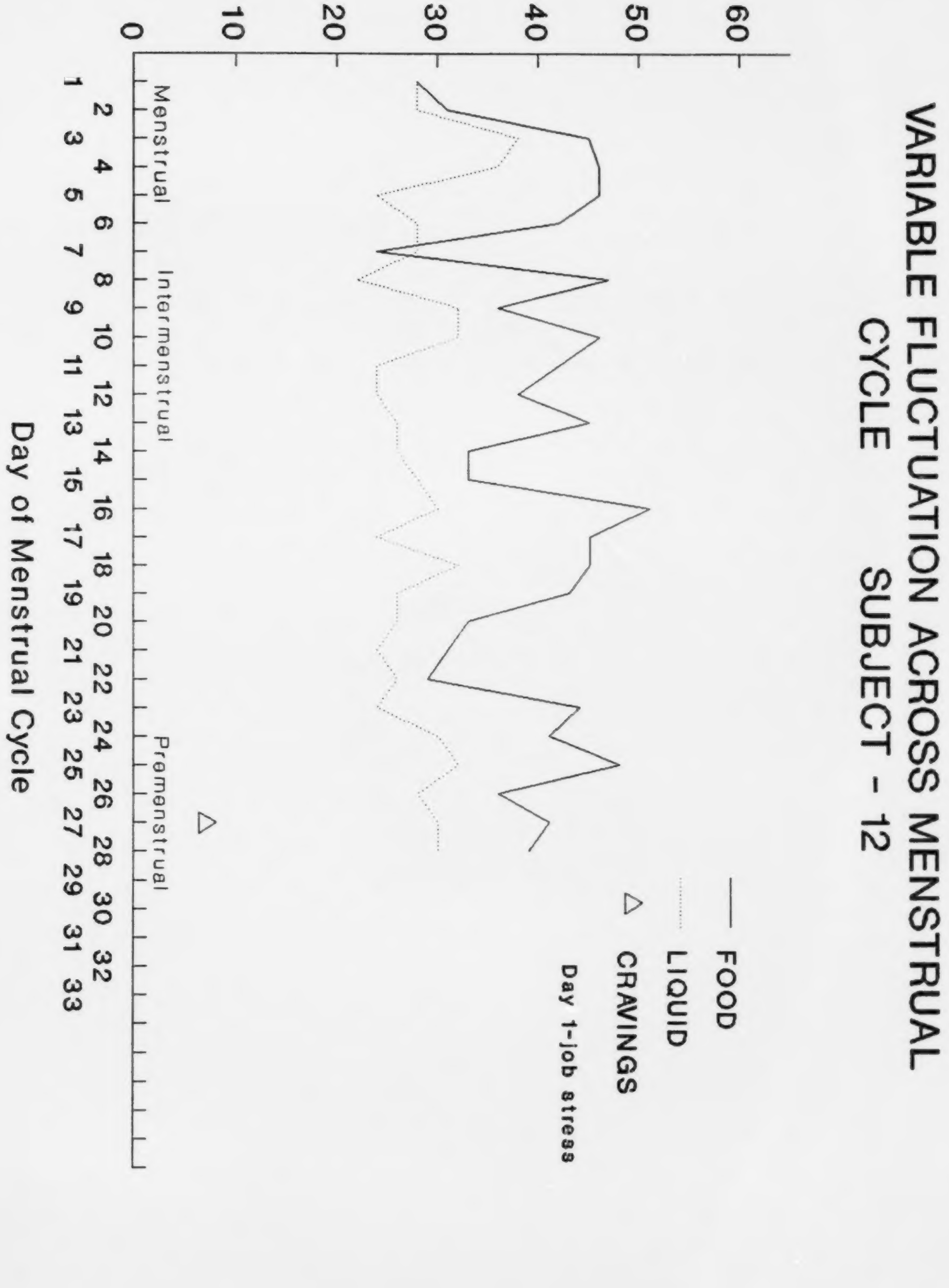

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 12
FOOD
LIQUID
CRAVINGS
Day 1-job stress
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-13.

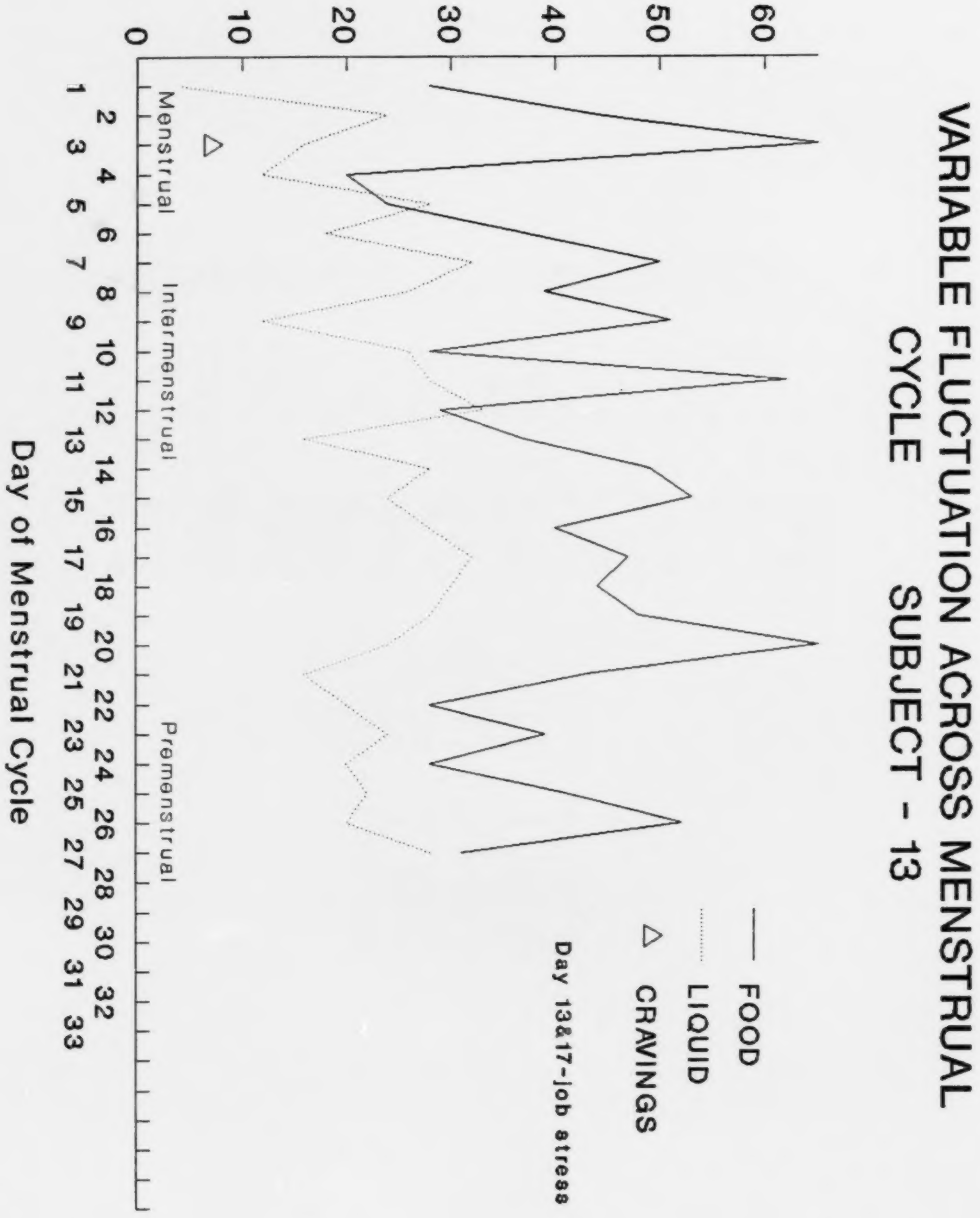

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 13
FOOD
LIQUID
CRAVINGS
Day 13&17-Job stress
0
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-14.

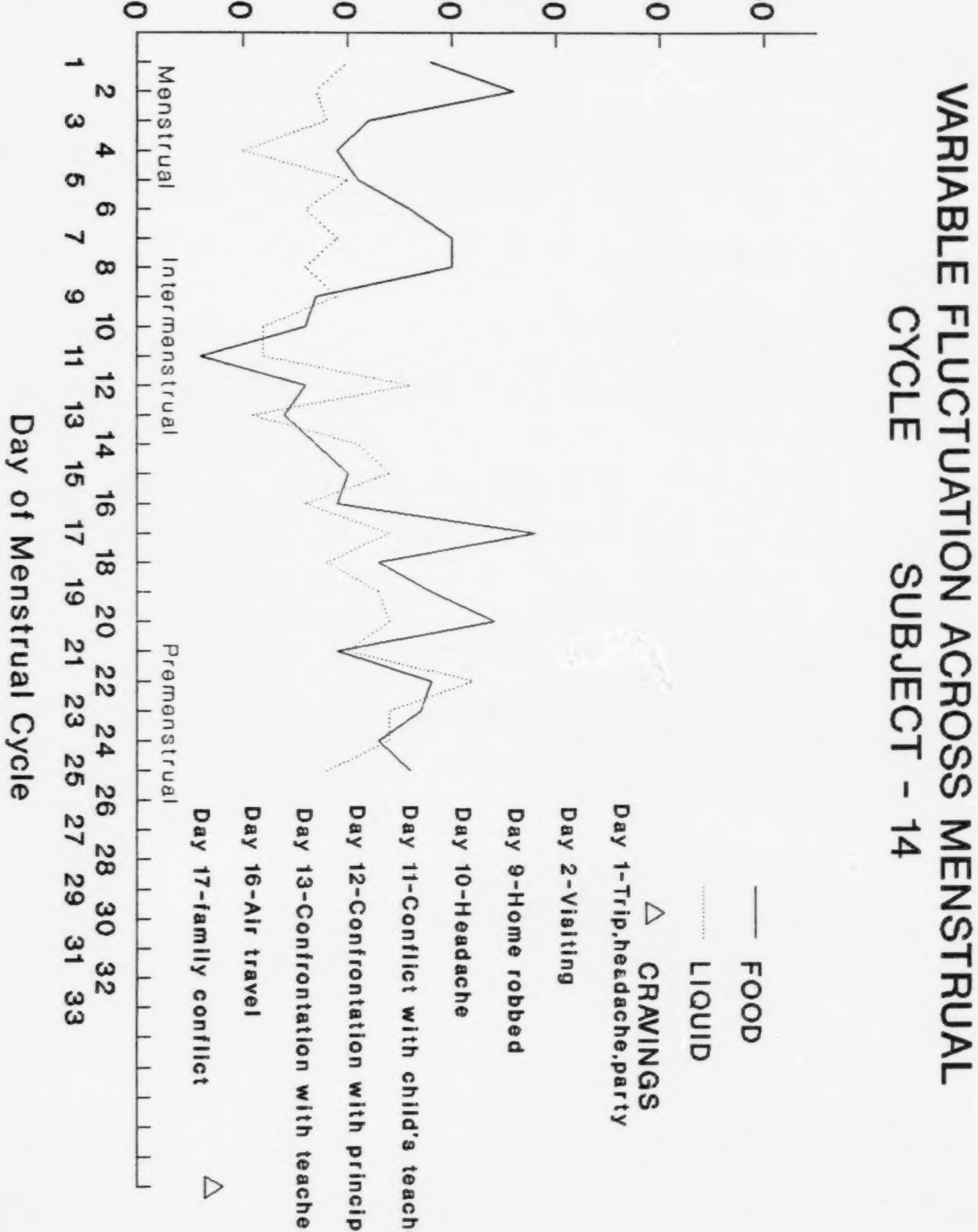

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 14
FOOD
LIQUID
△ CRAVINGS
Day 1-Trip,headache,party
Day 2-Visiting
Day 9-Home robbed
Day 10-Headache
Day 11-Conflict with child's teacher
Day 12-Confrontation with principal
Day 13-Confrontation with teacher
Day 16-Air travel
Day 17-family conflict
60
50
40
30
20
10
0
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-15.

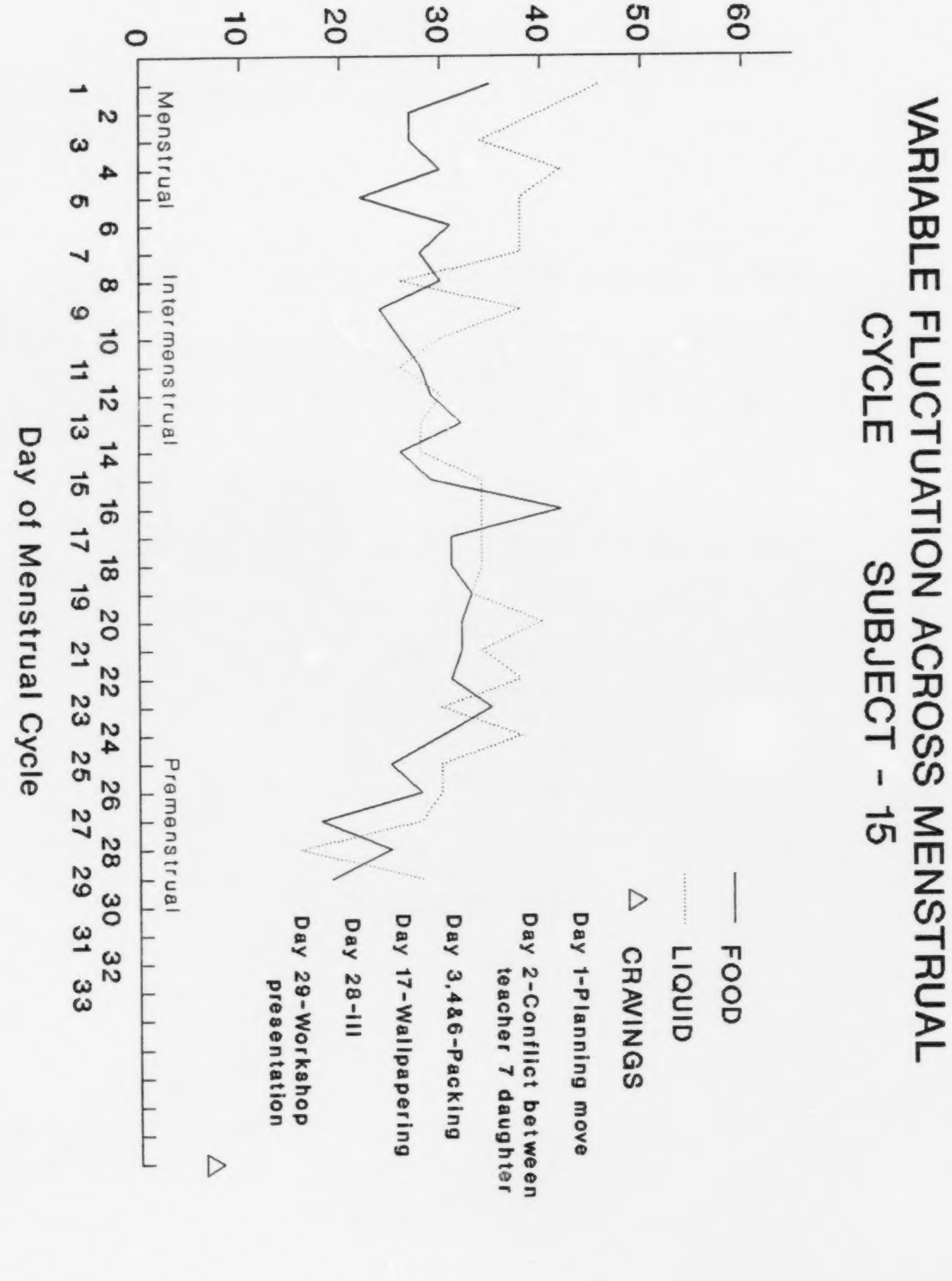
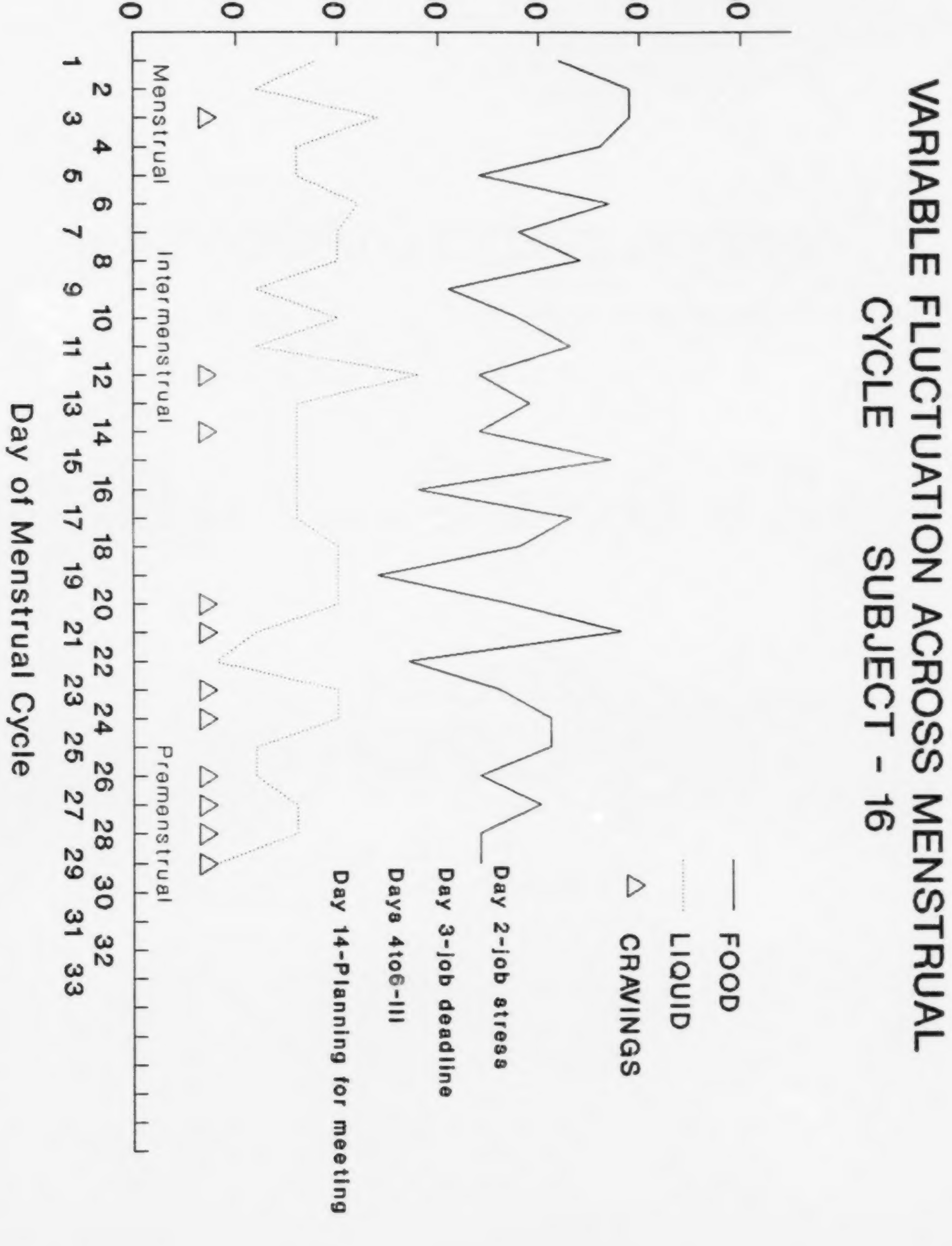

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 15
FOOD
LIQUID
△ CRAVINGS
Day 1-Planning move
Day 2-Conflict between teacher 7 daughter
Day 3,4&6-Packing
Day 17-Wallpapering
Day 28-Ill
Day 29-Workshop presentation
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle
△

Figure D-16.



Day 2-job stress
Day 3-job deadline
Days 4to6-Ill
Day 14-Planning for meeting

Figure D-17.

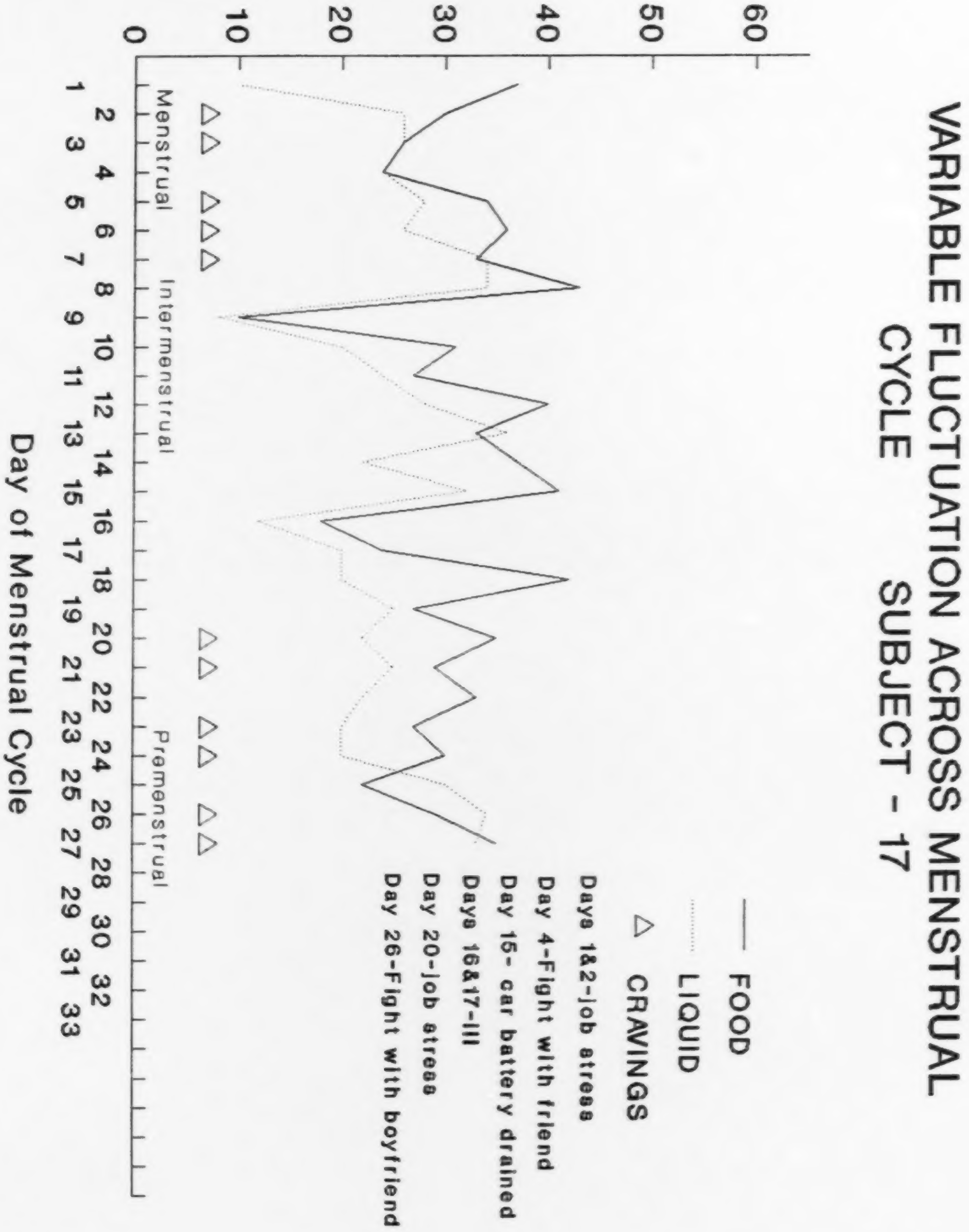

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 17
FOOD
LIQUID
△ CRAVINGS
Days 1&2-job stress
Day 4-Fight with friend
Day 15- car battery drained
Days 16&17-ill
Day 20-job stress
Day 26-Fight with boyfriend
0
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-18.

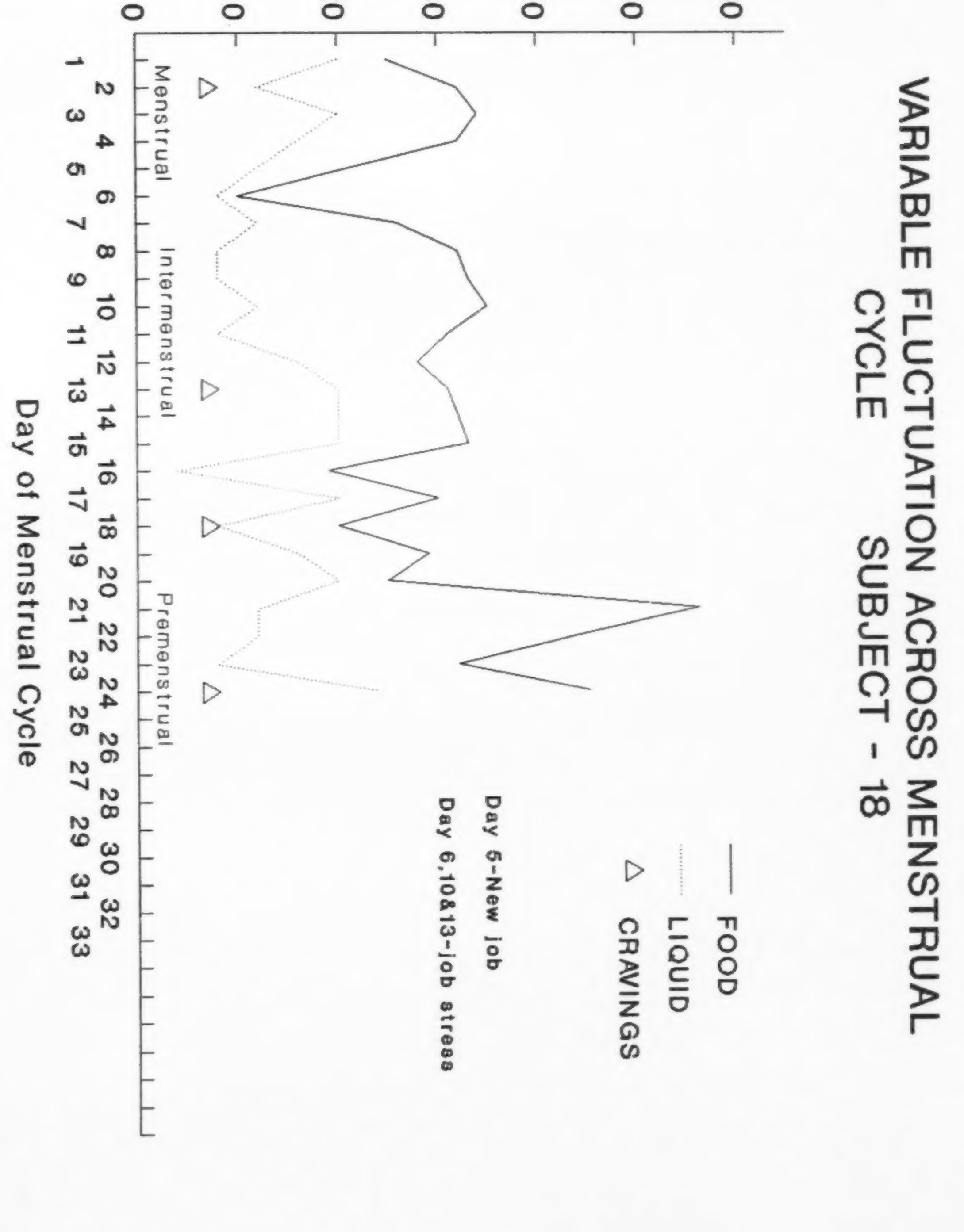

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE
SUBJECT - 18
FOOD
LIQUID
CRAVINGS
Day 5-New job
Day 6,10&13-job stress
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-19.

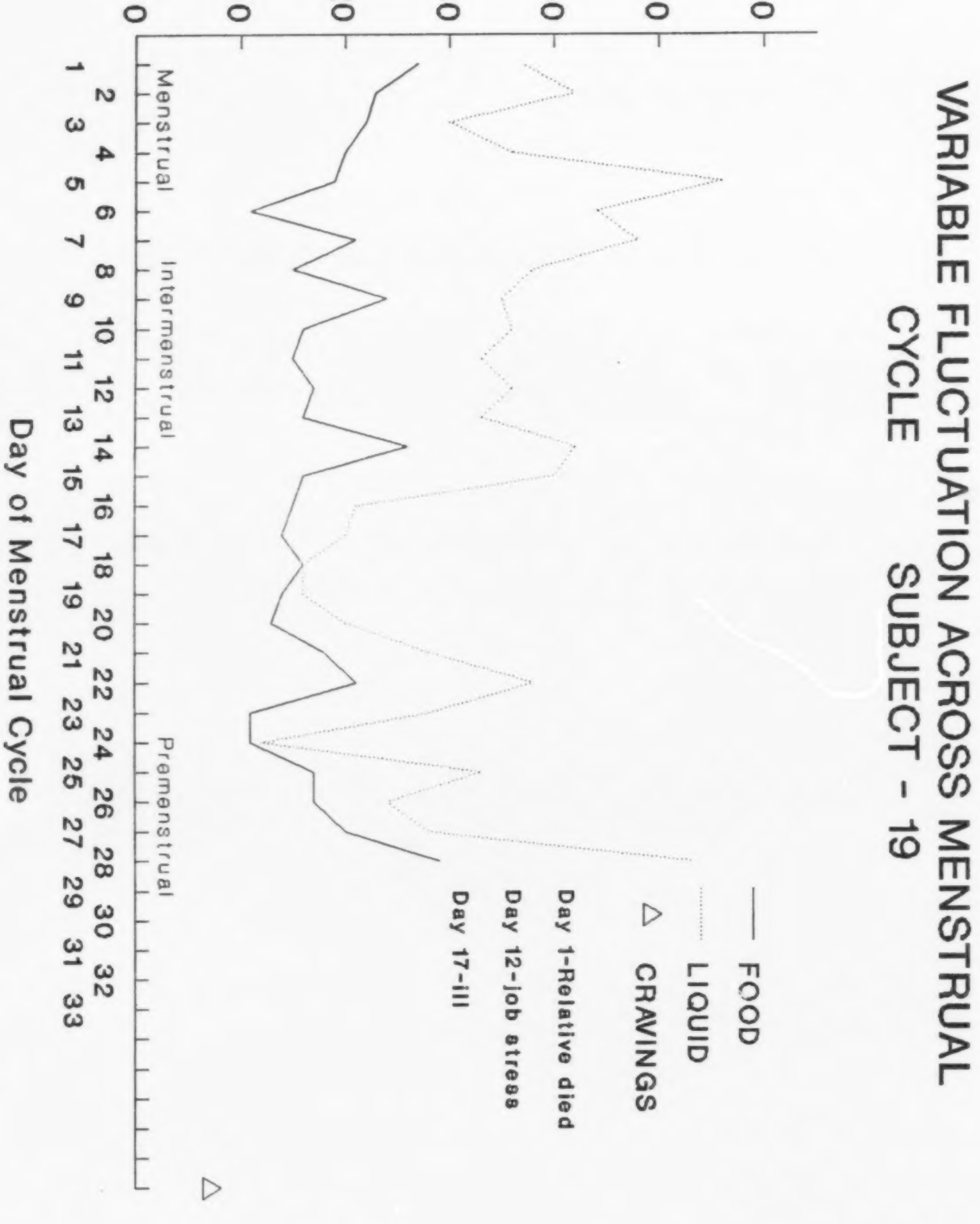

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 19
— FOOD
LIQUID
△ CRAVINGS
Day 1-Relative died
Day 12-job stress
Day 17-ill
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-20.

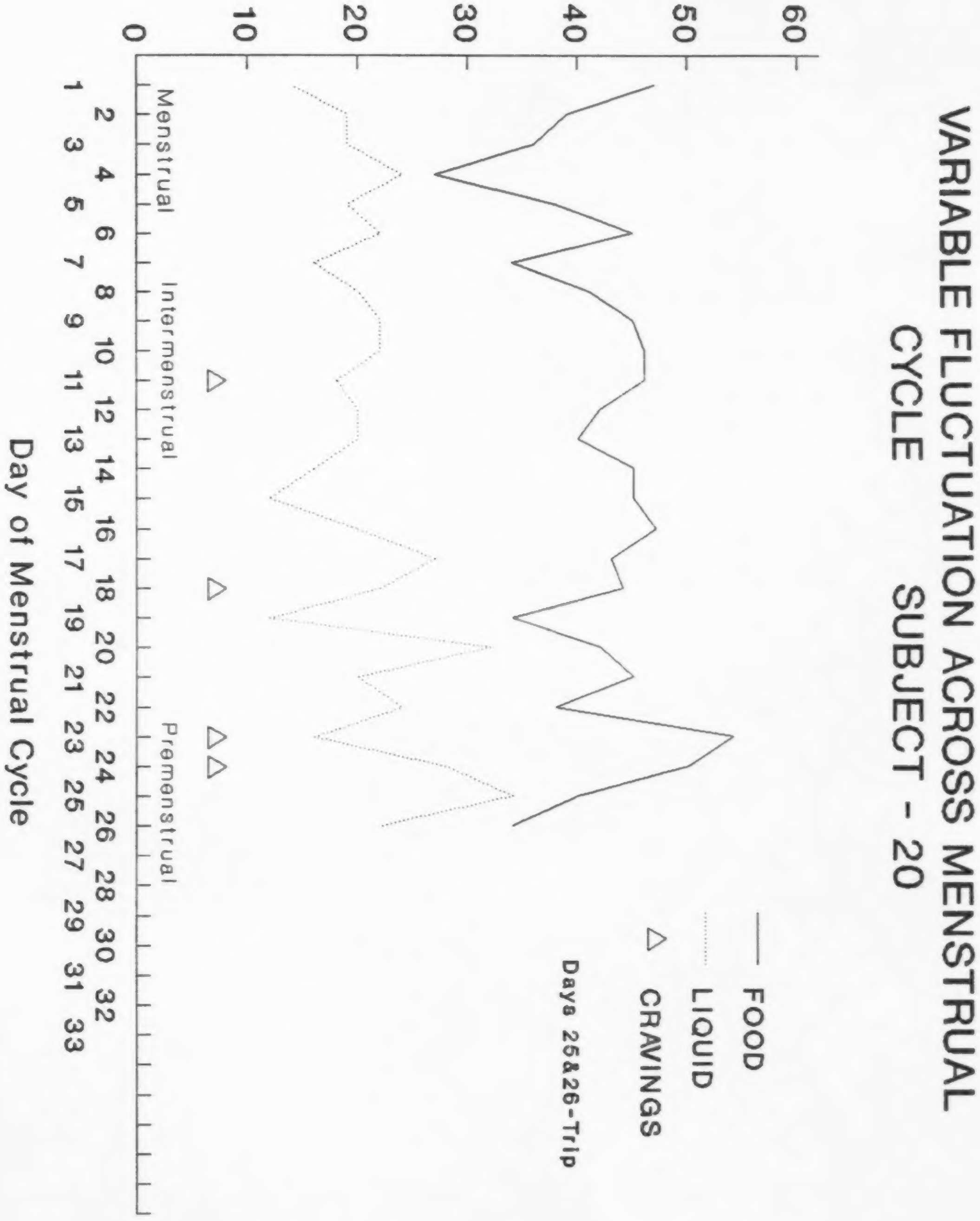

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE
SUBJECT - 20
FOOD
LIQUID
△ CRAVINGS
Days 25&26-Trip
0
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Day of Menstrual Cycle

Figure D-21.

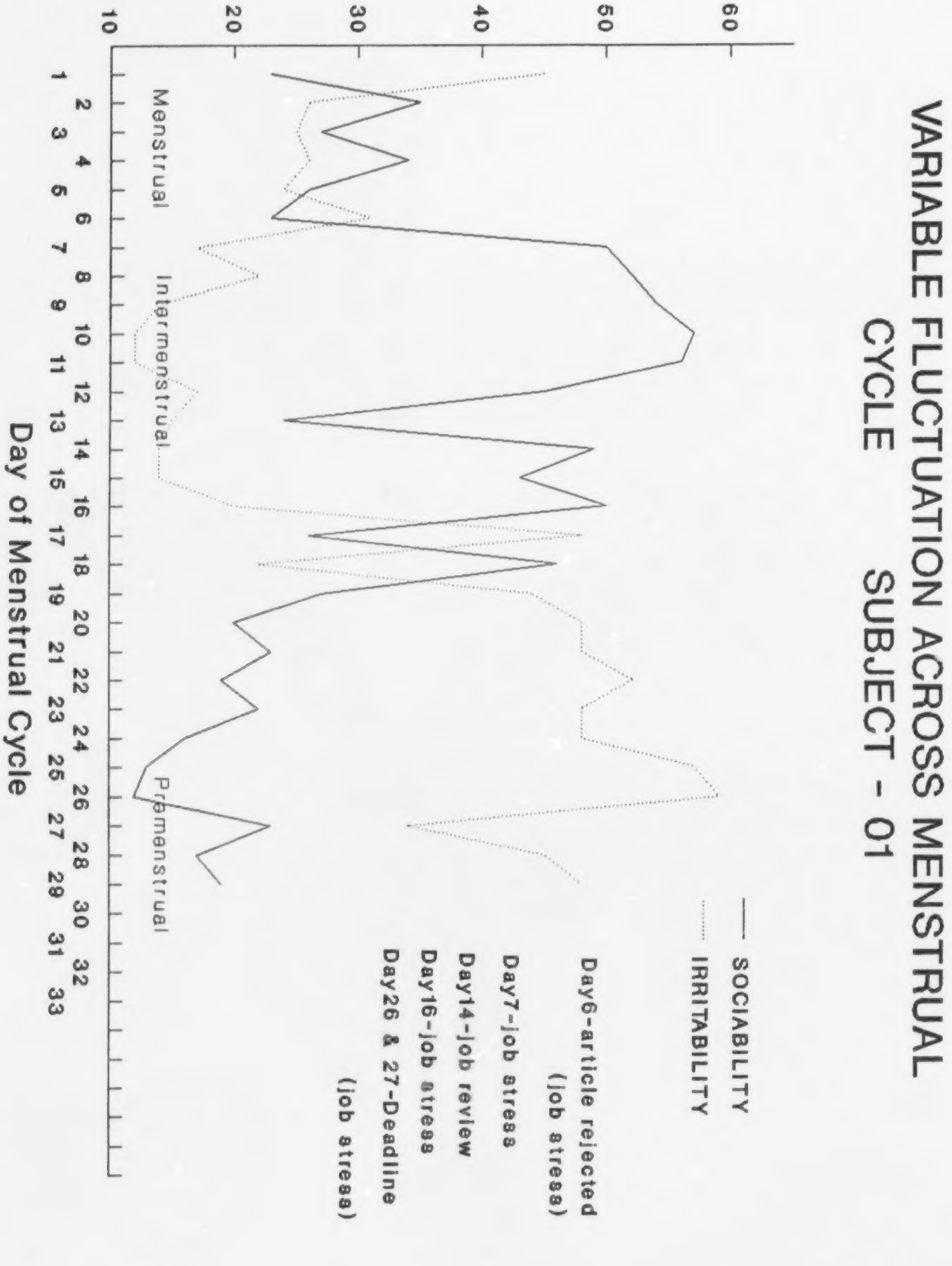

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 01
SOCIABILITY
IRRITABILITY
Day6-article rejected (job stress)
Day7-job stress
Day14-job review
Day16-job stress
Day26 & 27-Deadline (job stress)
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-22.

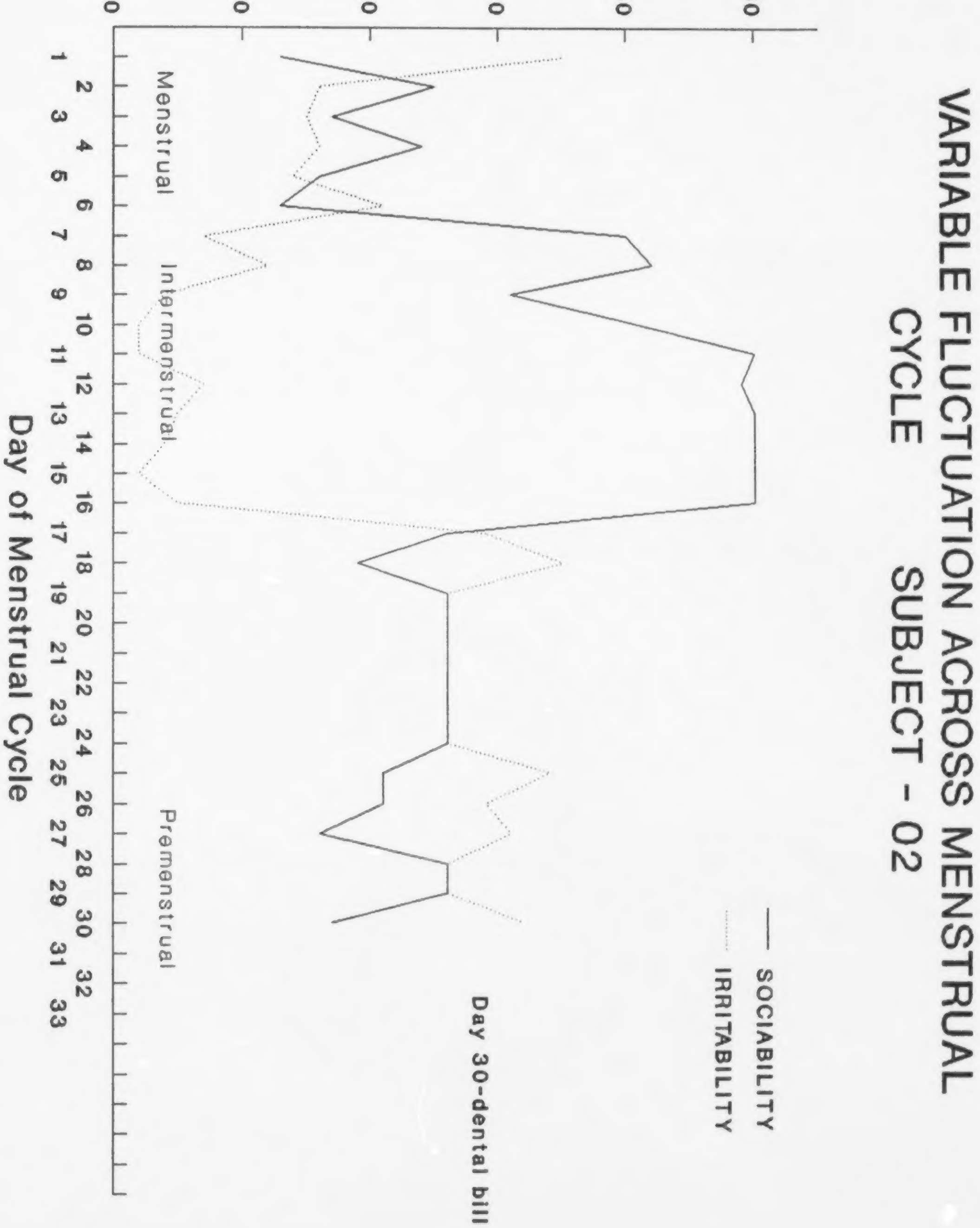

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 02
SOCIABILITY
IRRITABILITY
Day 30-dental bill
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-23.

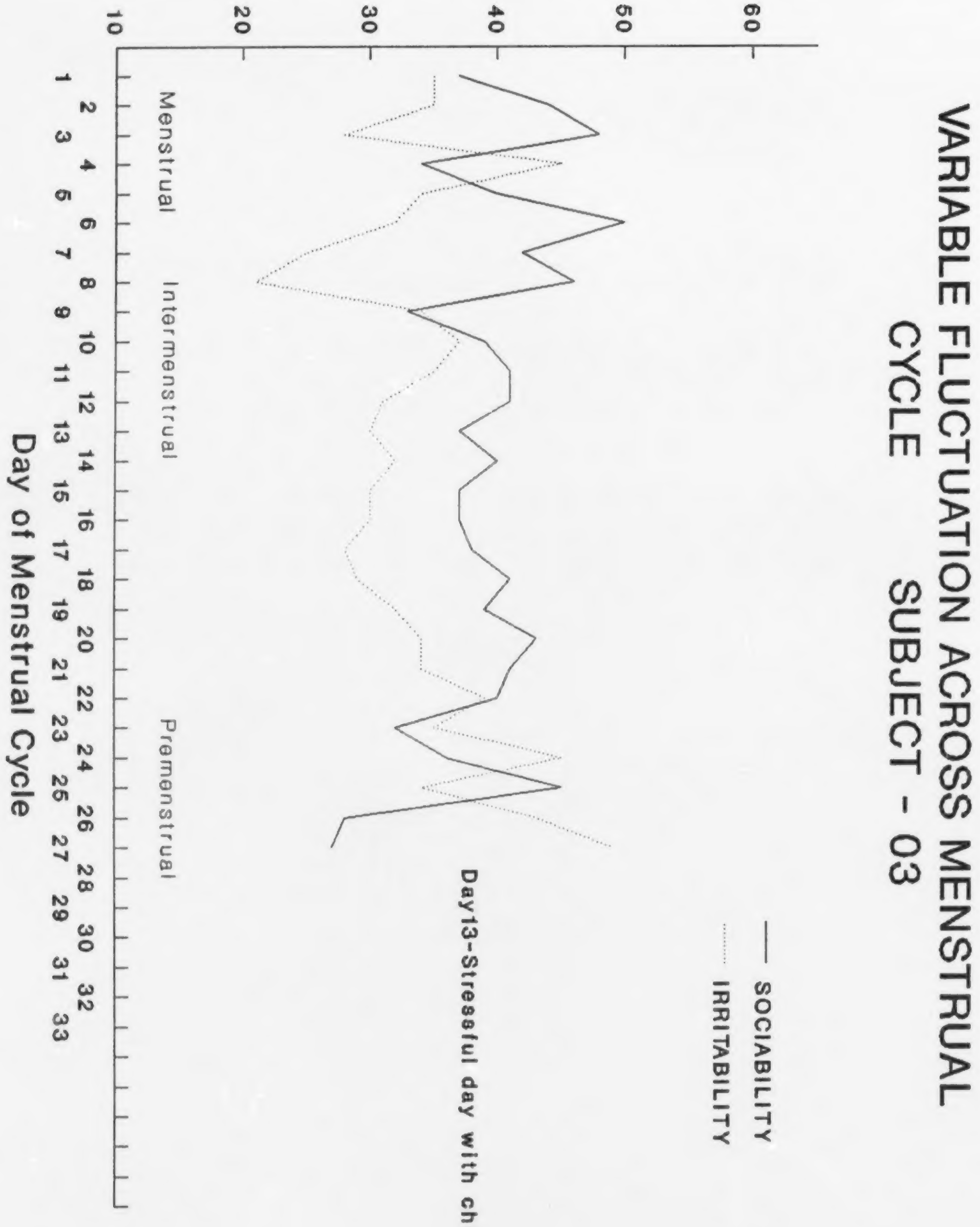

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 03
SOCIABILITY
IRRITABILITY
Day13-Stressful day with child
60
50
40
30
20
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-24.

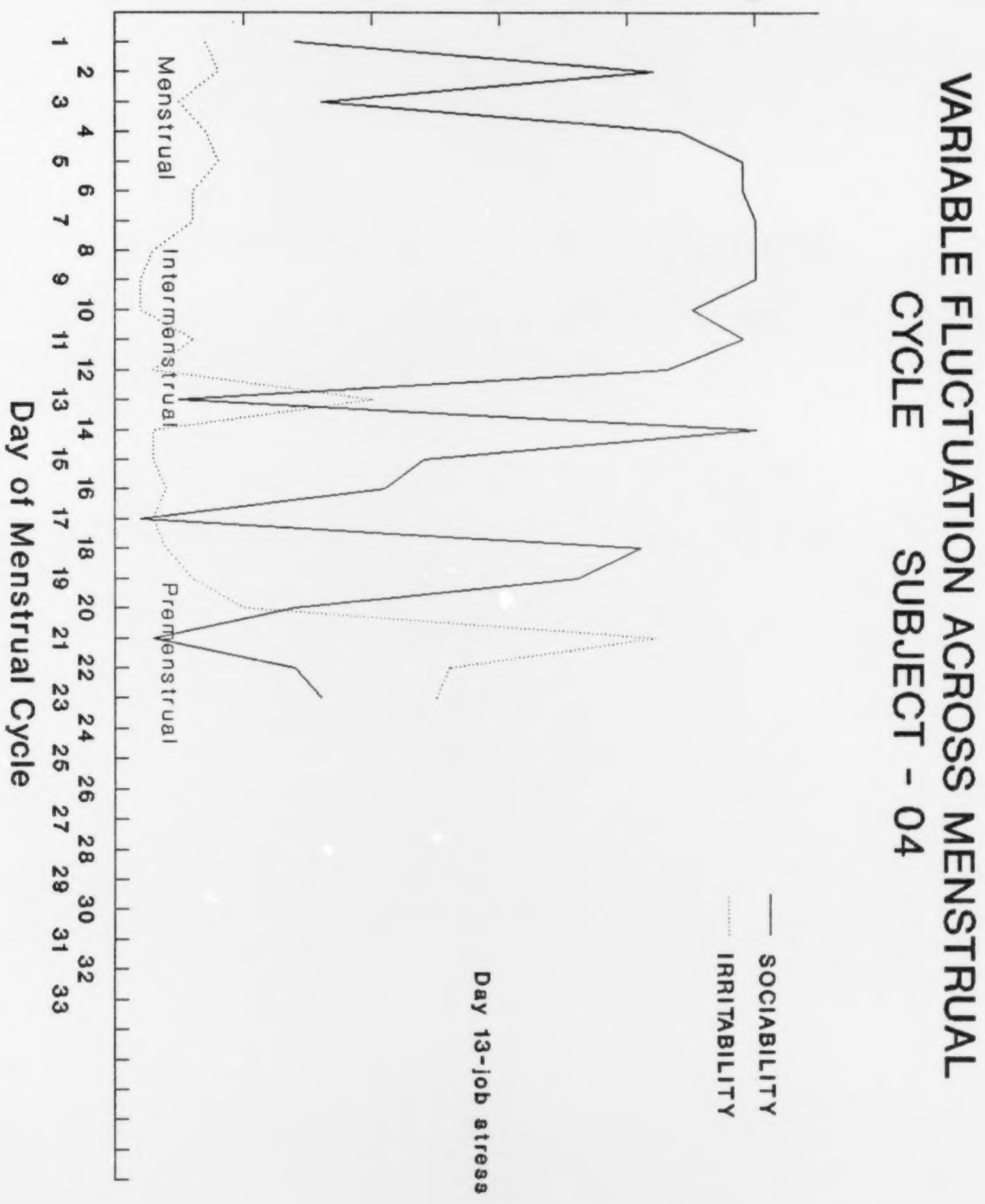

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 04
SOCIABILITY
IRRITABILITY
Day 13-job stress
Menstrual
Intermenstrual
Premenstrual
10
20
30
40
50
60
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Day of Menstrual Cycle

Figure D-25.

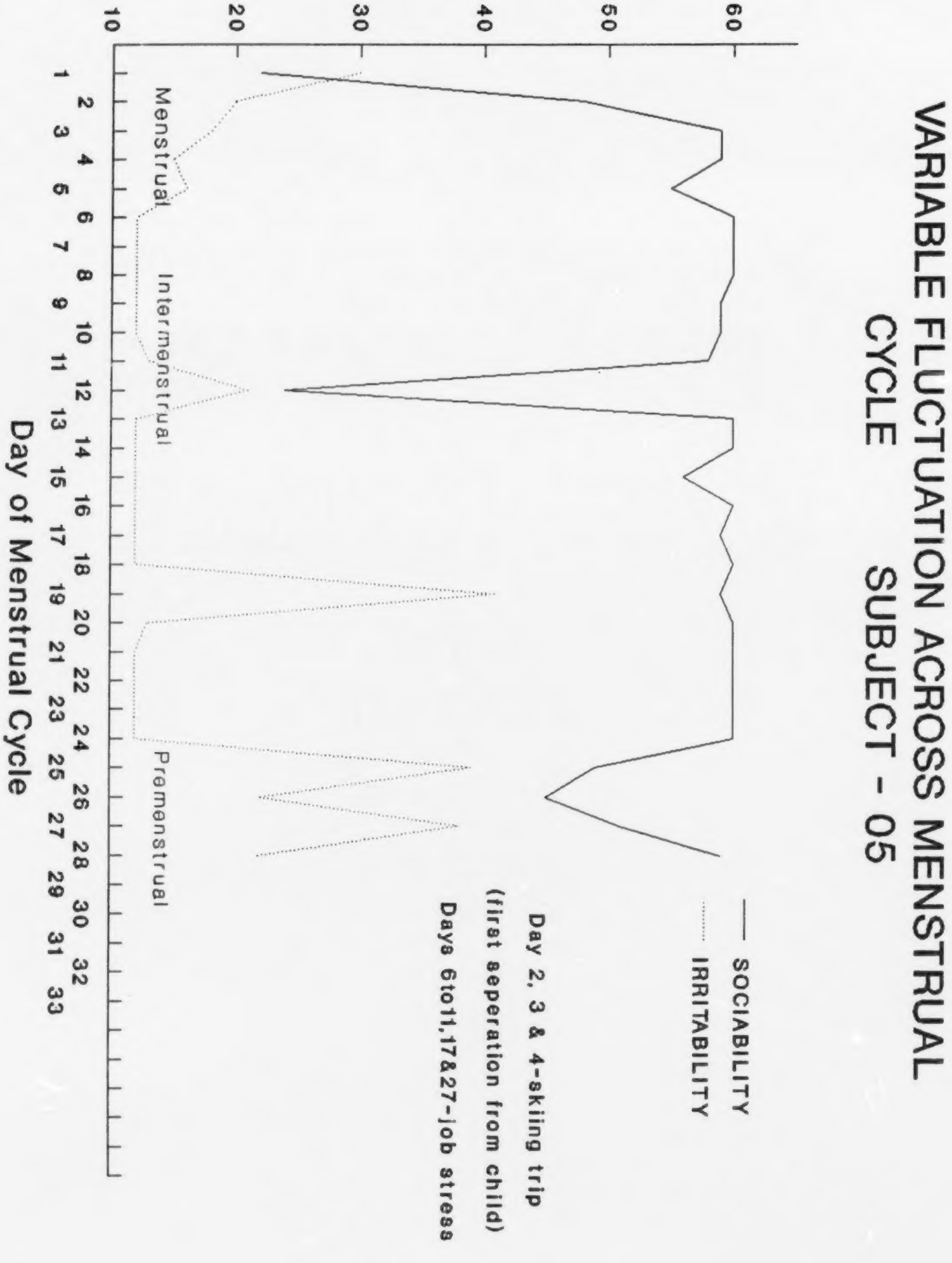

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 05
— SOCIABILITY
····· IRRITABILITY
Day 2, 3 & 4-skiing trip
(first seperation from child)
Days 6to11,17&27-job stress
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Day of Menstrual Cycle

Figure D-26.

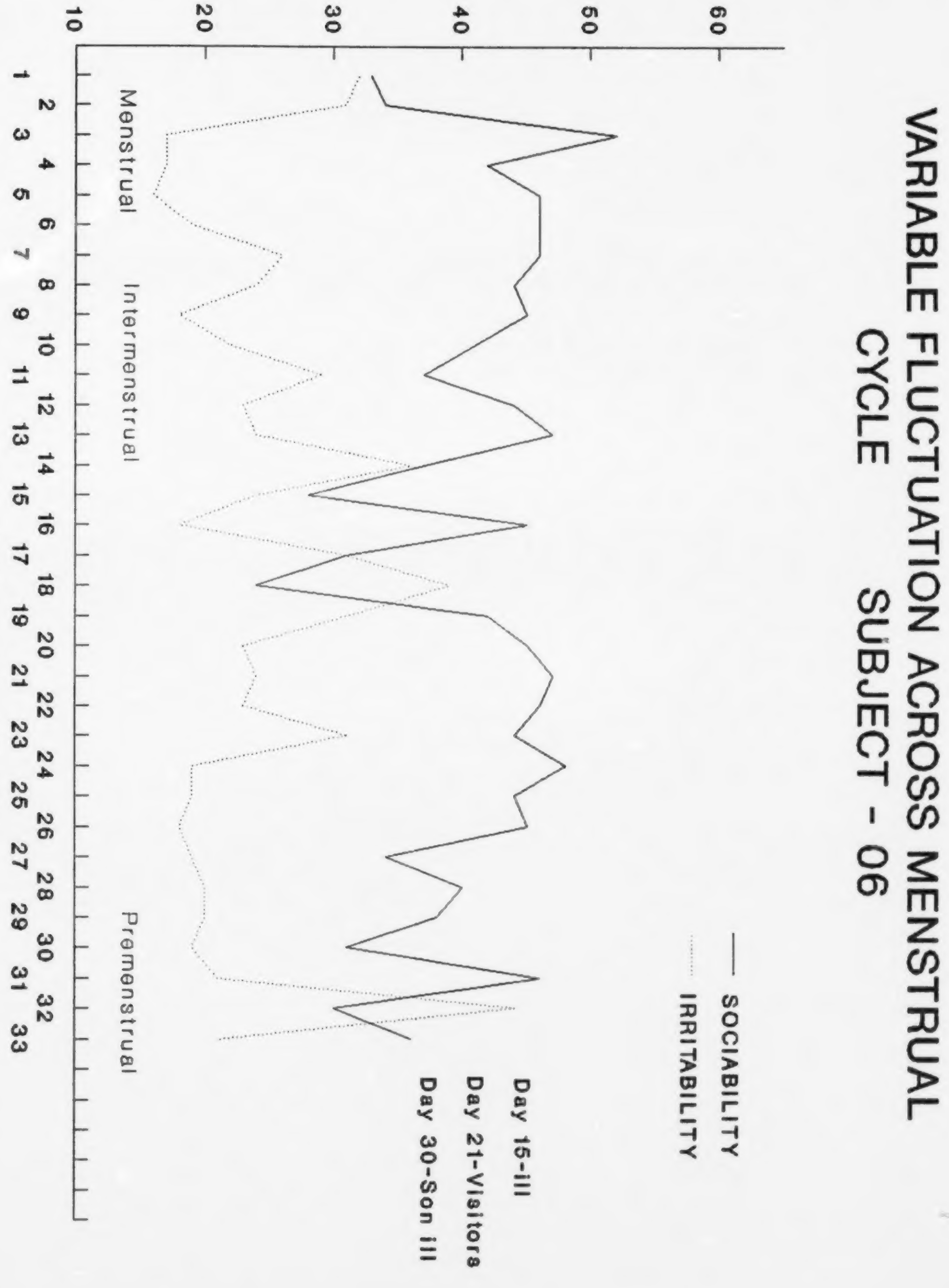

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE
SUBJECT - 06
SOCIABILITY
IRRITABILITY
Day 15-Ill
Day 21-Visitors
Day 30-Son ill
60
50
40
30
20
10
Menstrual
Intermenstrual
Premenstrual
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Day of Menstrual Cycle

Figure D-27.

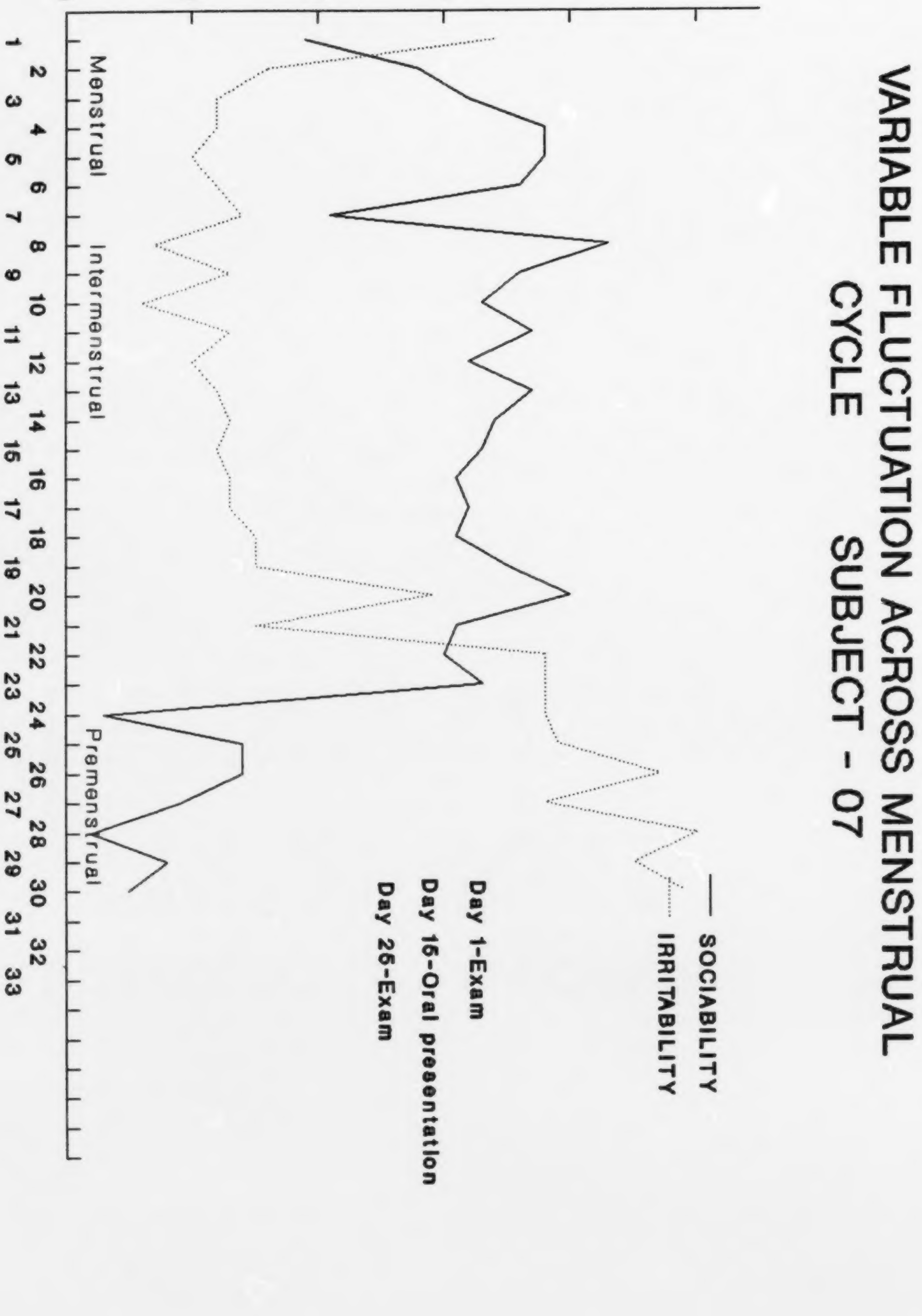

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 07
SOCIABILITY
IRRITABILITY
Day 1-Exam
Day 15-Oral presentation
Day 25-Exam
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

Figure D-28.

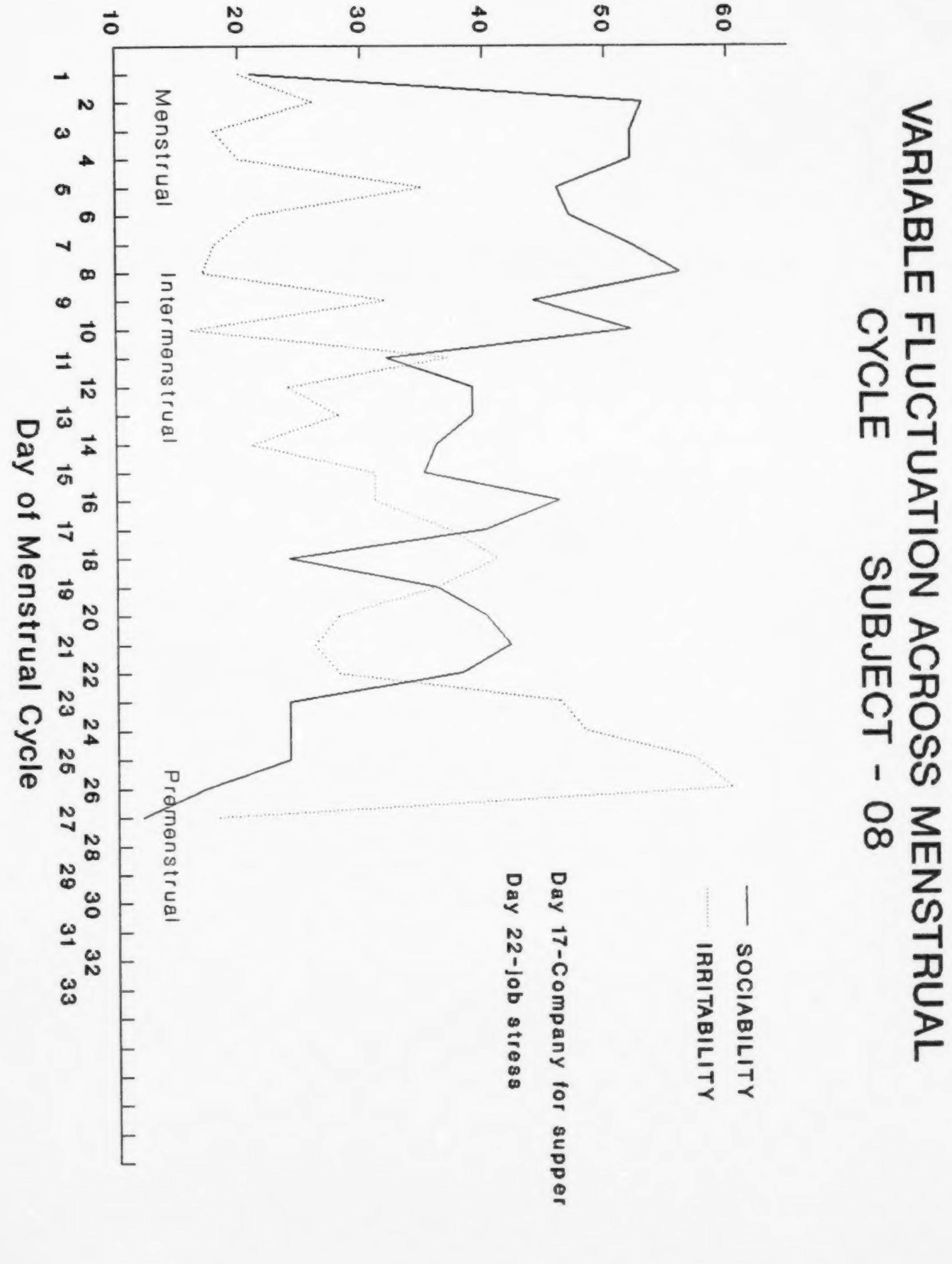

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 08
SOCIABILITY
IRRITABILITY
Day 17-Company for supper
Day 22-job stress
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-29.

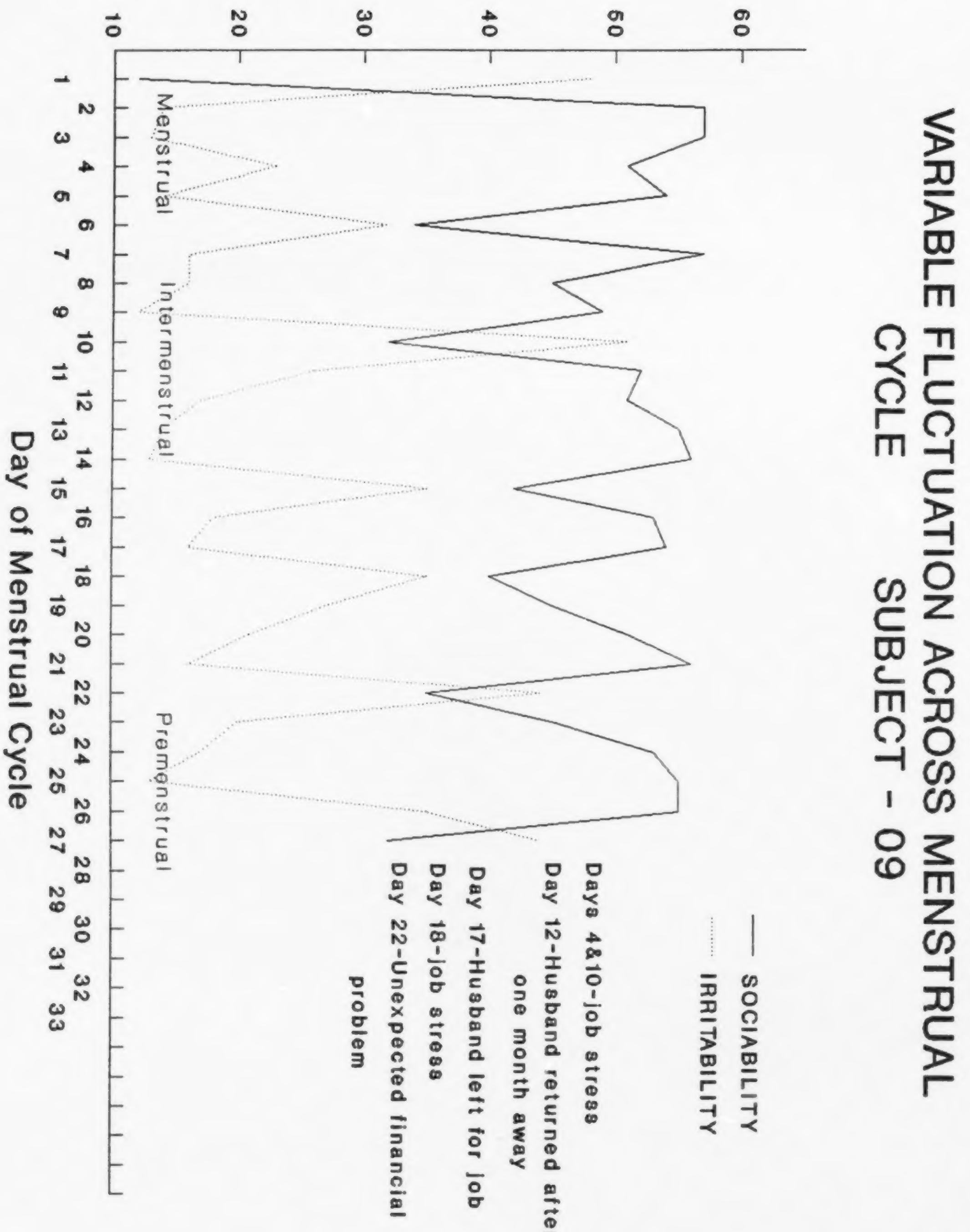
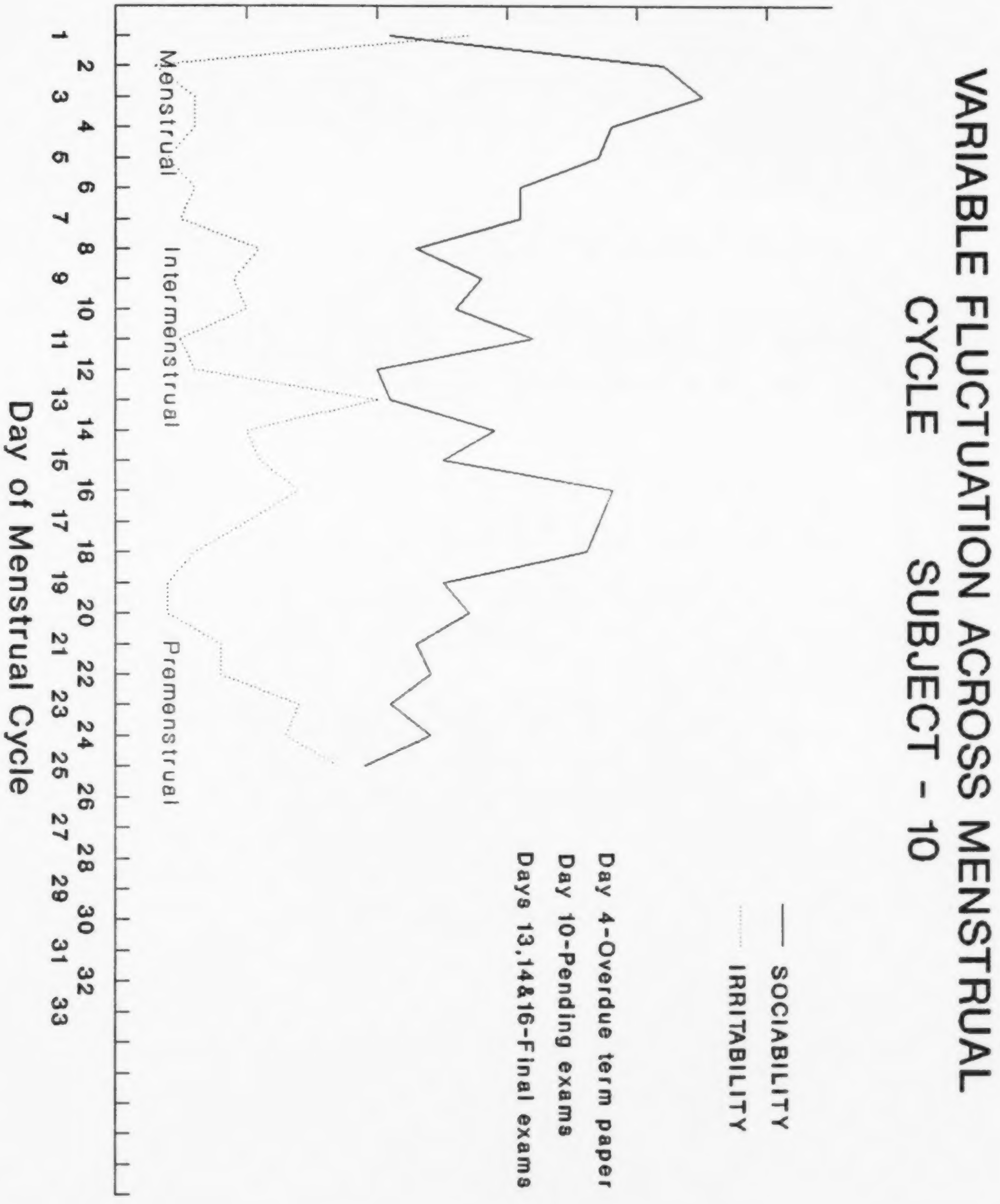
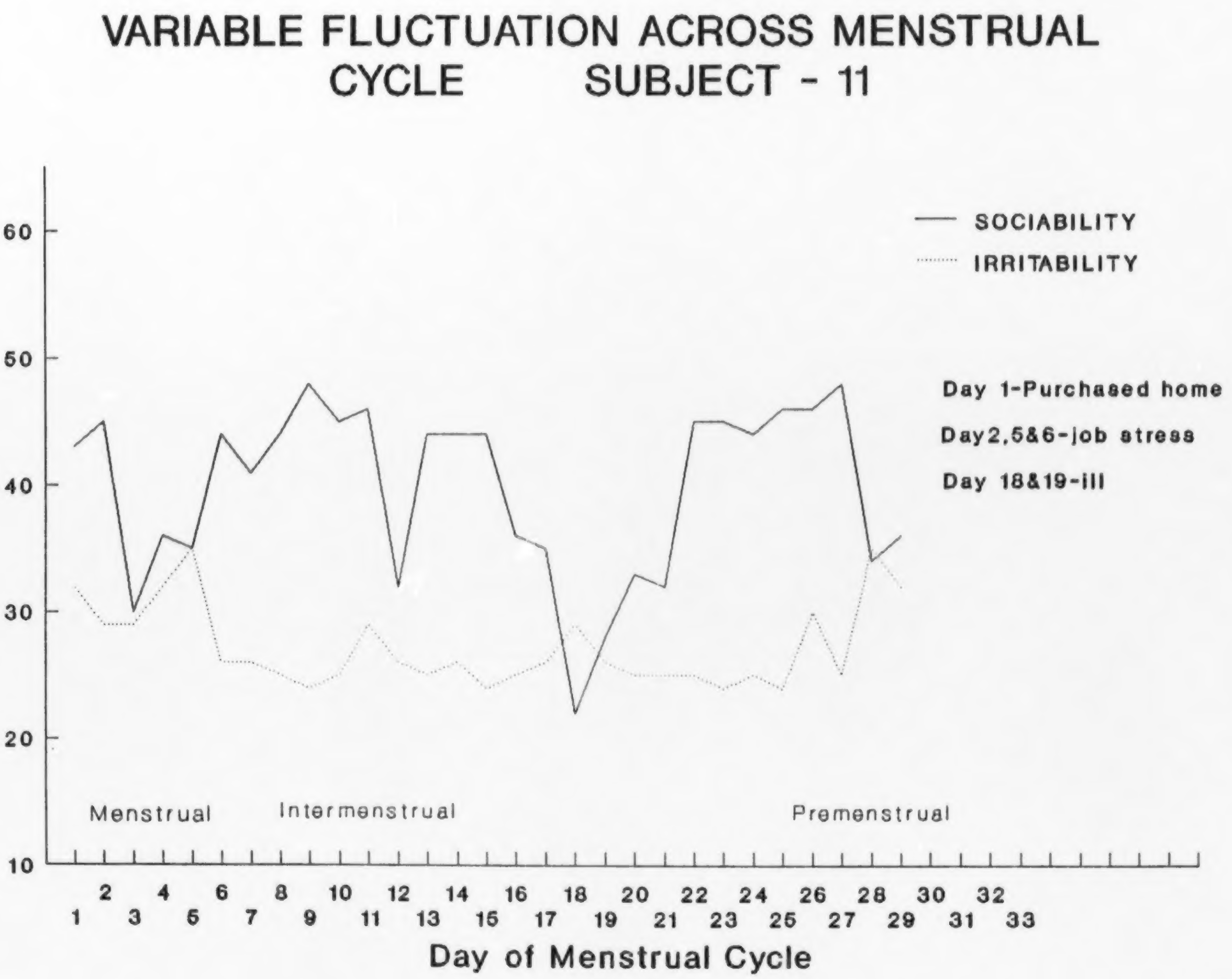

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 09
SOCIABILITY
IRRITABILITY
Days 4&10-job stress
Day 12-Husband returned after one month away
Day 17-Husband left for job
Day 18-job stress
Day 22-Unexpected financial problem
Menstrual
Intermenstrual
Premenstrual
60
50
40
30
20
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
Day of Menstrual Cycle

Figure D-30.



VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 10

Figure D-31.



VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 11

Figure D-32.

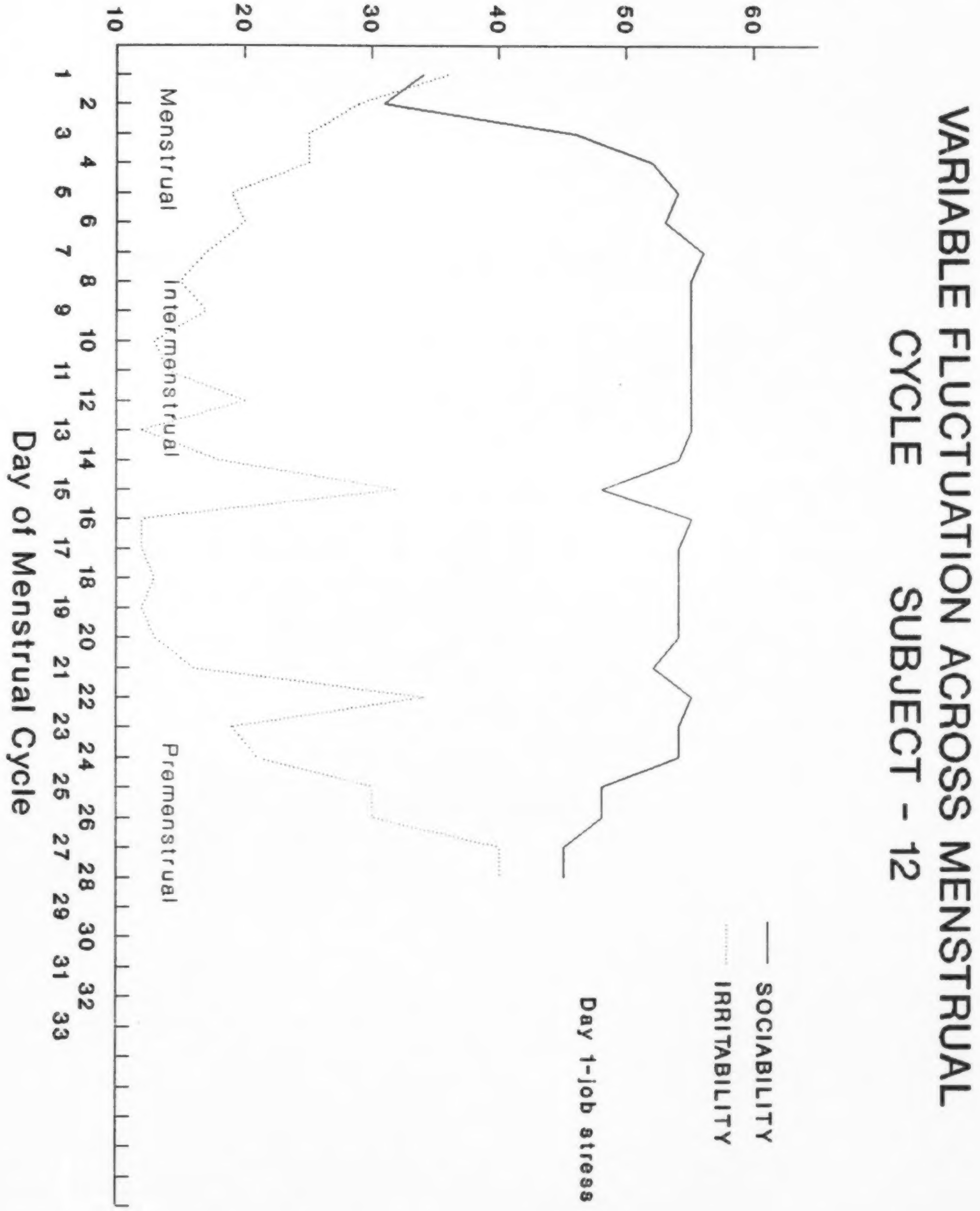

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 12
SOCIABILITY
IRRITABILITY
Day 1-job stress
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-33.

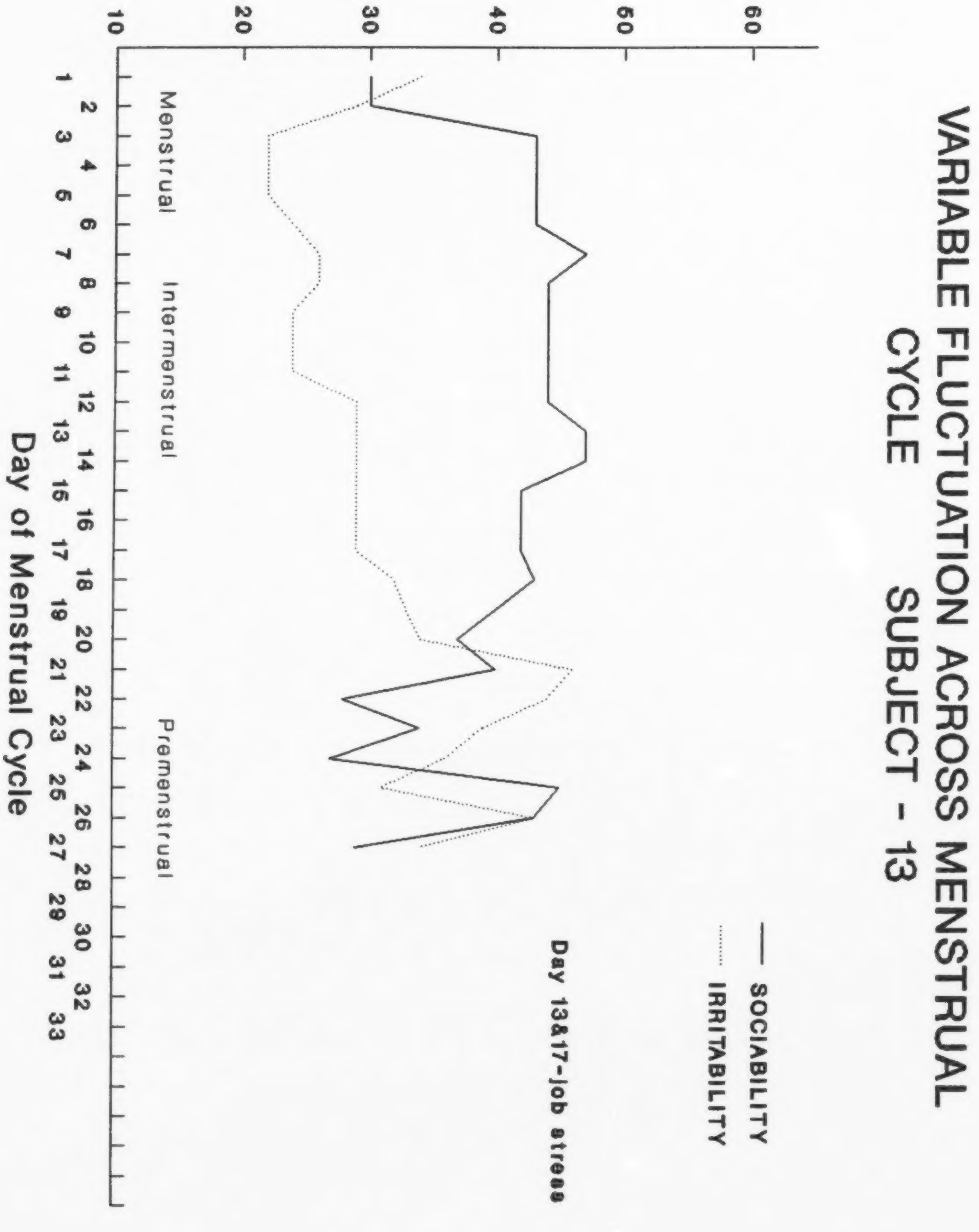

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 13
SOCIABILITY
IRRITABILITY
Day 13&17-Job stress
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-34.

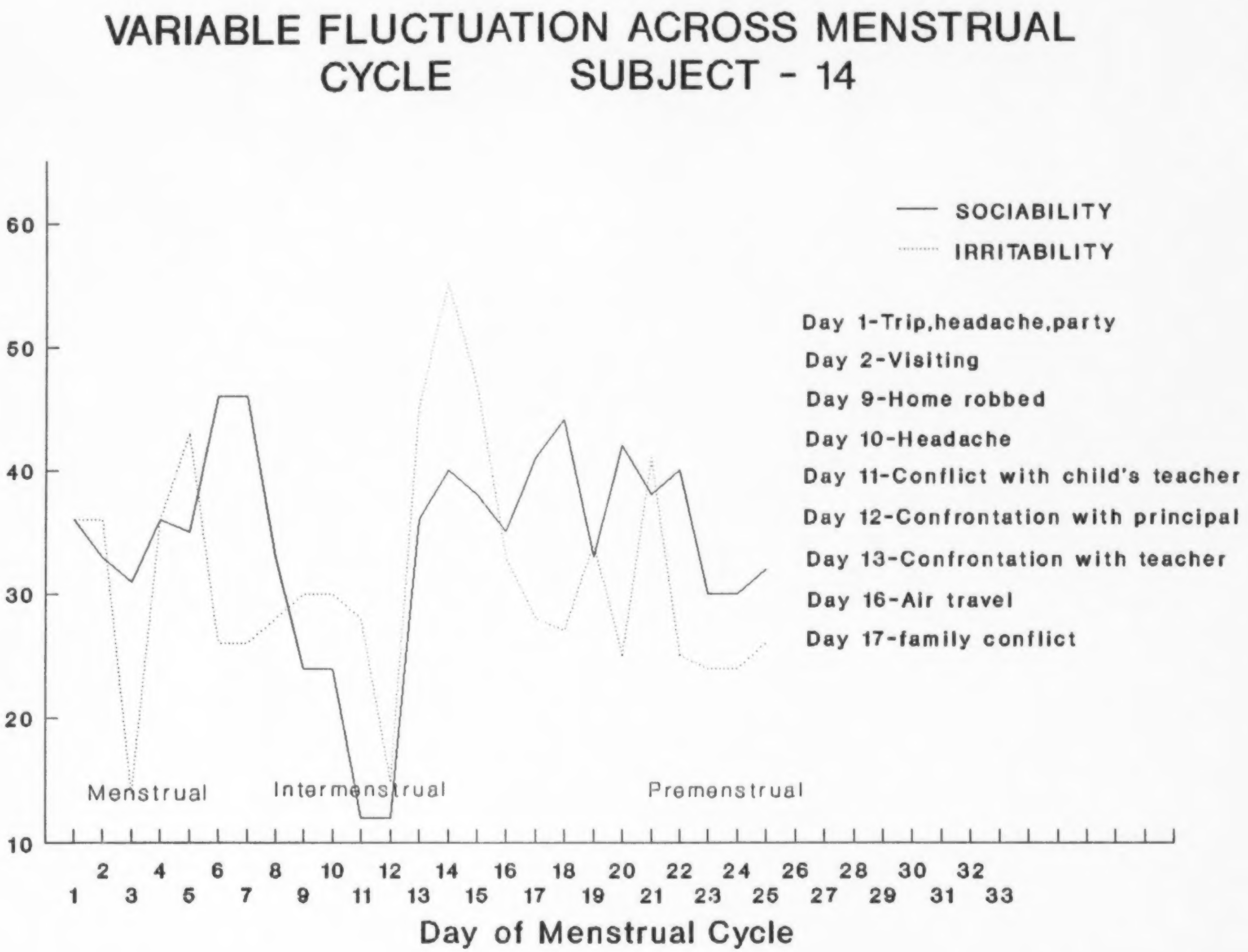

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 14
SOCIABILITY
IRRITABILITY
Day 1-Trip,headache,party
Day 2-Visiting
Day 9-Home robbed
Day 10-Headache
Day 11-Conflict with child's teacher
Day 12-Confrontation with principal
Day 13-Confrontation with teacher
Day 16-Air travel
Day 17-family conflict
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-35.

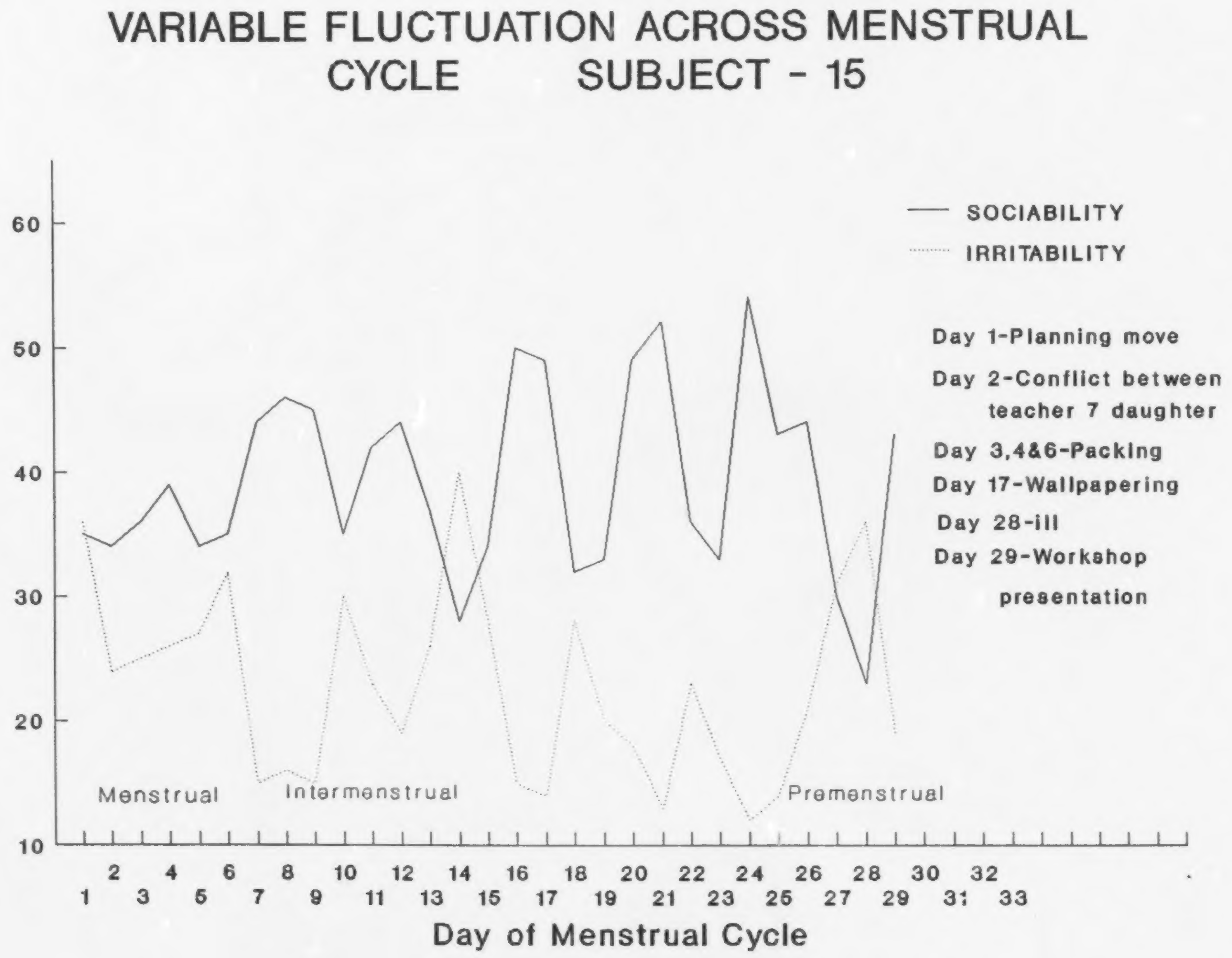
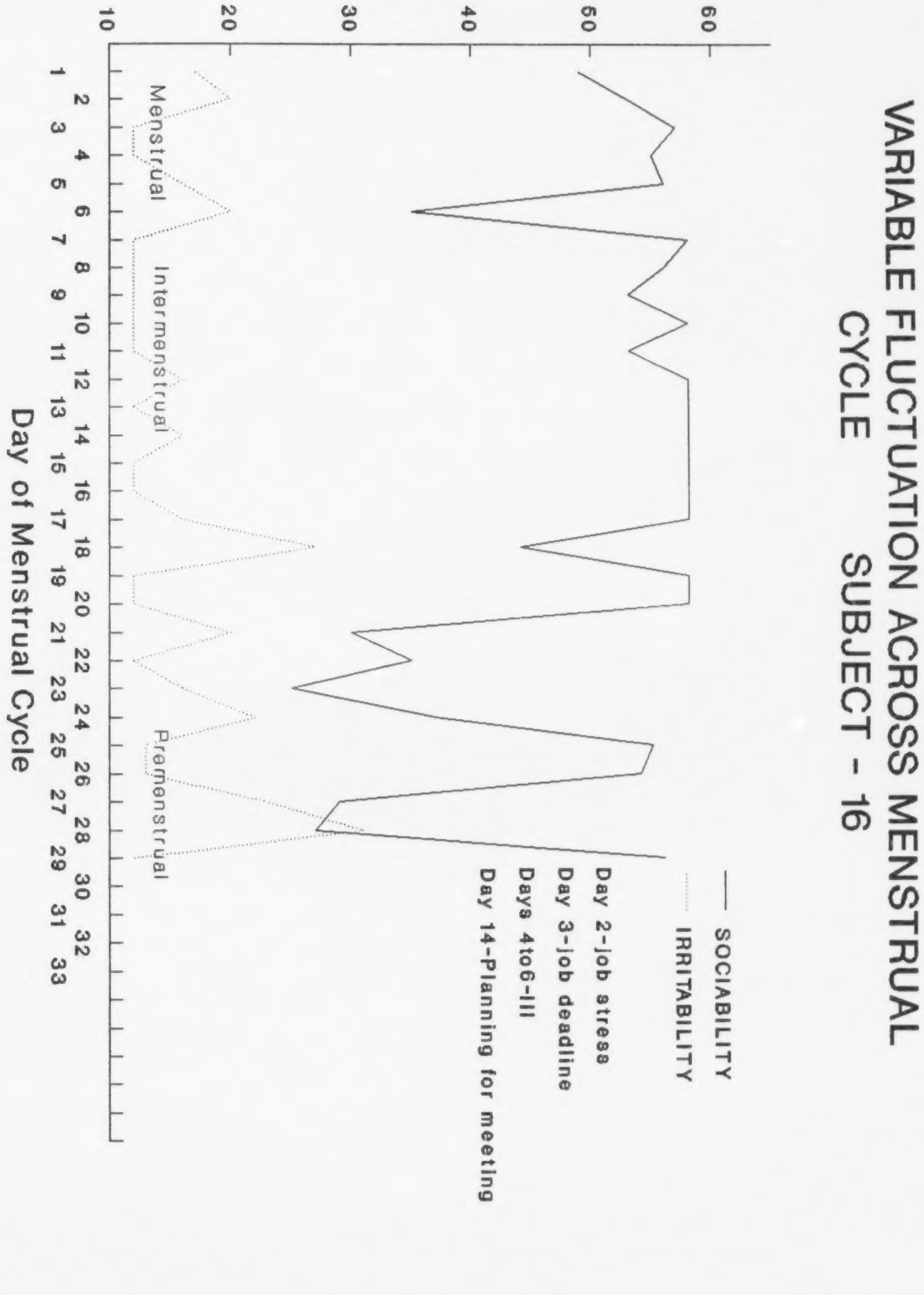

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 15
SOCIABILITY
IRRITABILITY
Day 1-Planning move
Day 2-Conflict between teacher 7 daughter
Day 3,4&6-Packing
Day 17-Wallpapering
Day 28-ill
Day 29-Workshop presentation
Menstrual
Intermenstrual
Premenstrual
10
20
30
40
50
60
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-36.


VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 16
SOCIABILITY
IRRITABILITY
Day 2-job stress
Day 3-job deadline
Days 4to6-ill
Day 14-Planning for meeting
60
50
40
30
20
10
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
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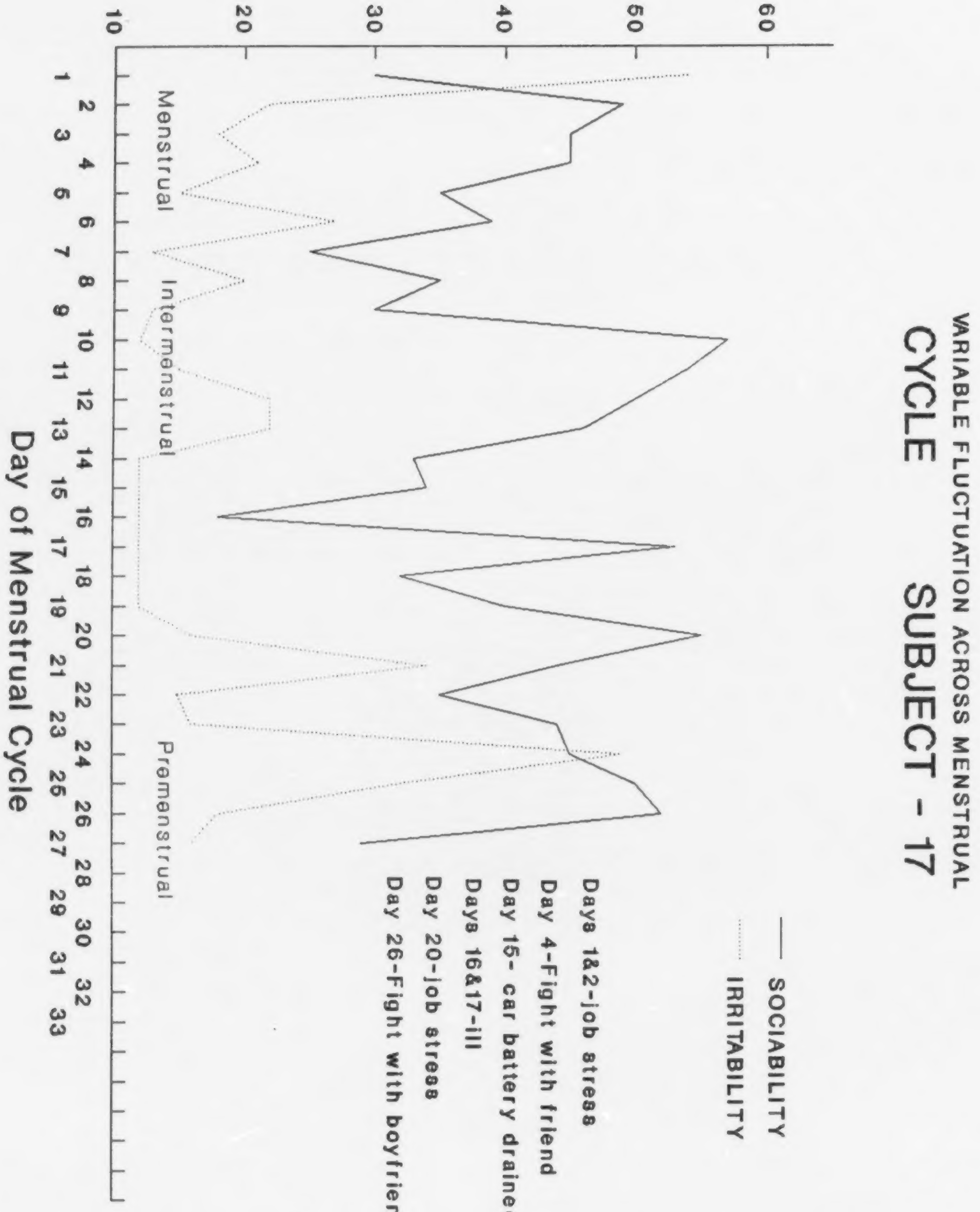
27
28
29
30
31
32
33
Menstrual
Intermenstrual
Premenstrual
Day of Menstrual Cycle

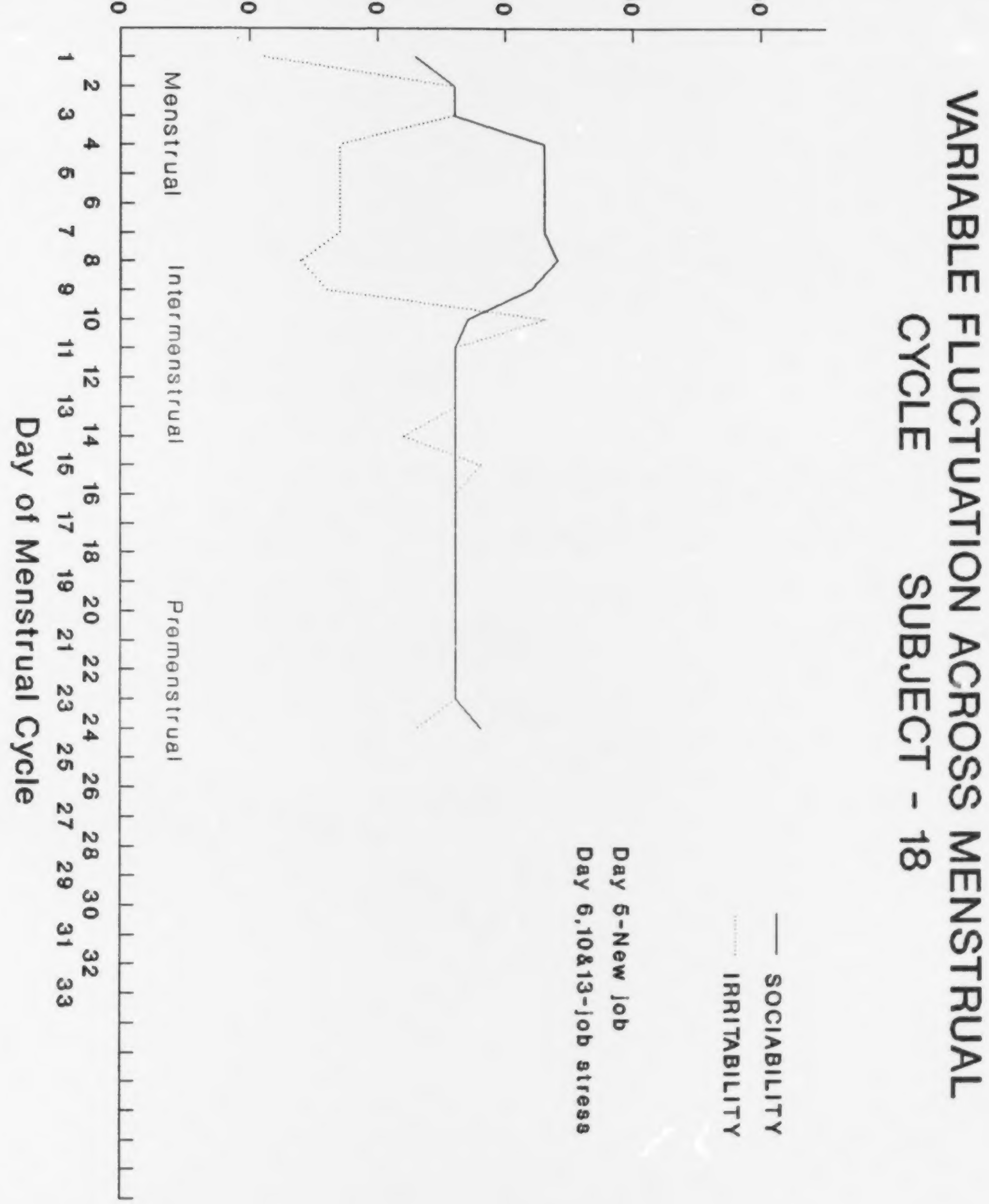
Figure D-37.



VARIABLE FLUCTUATION ACROSS MENSTRUAL
CYCLE SUBJECT - 17

Days 1&2-job stress
Day 4-Fight with friend
Day 15- car battery drained
Days 16&17-ill
Day 20-job stress
Day 26-Fight with boyfriend

Figure D-38.



VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 18

Figure D-39.

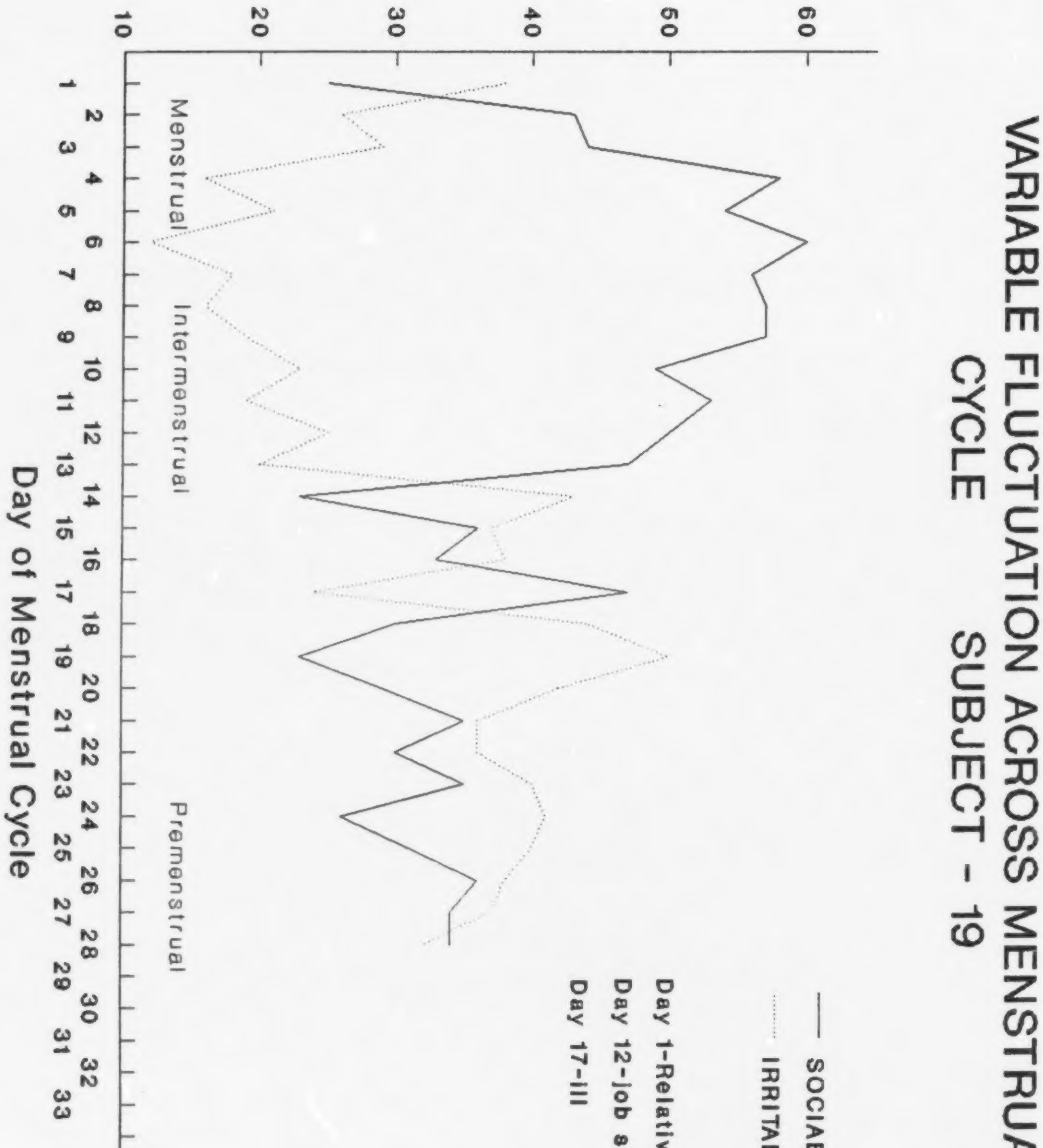
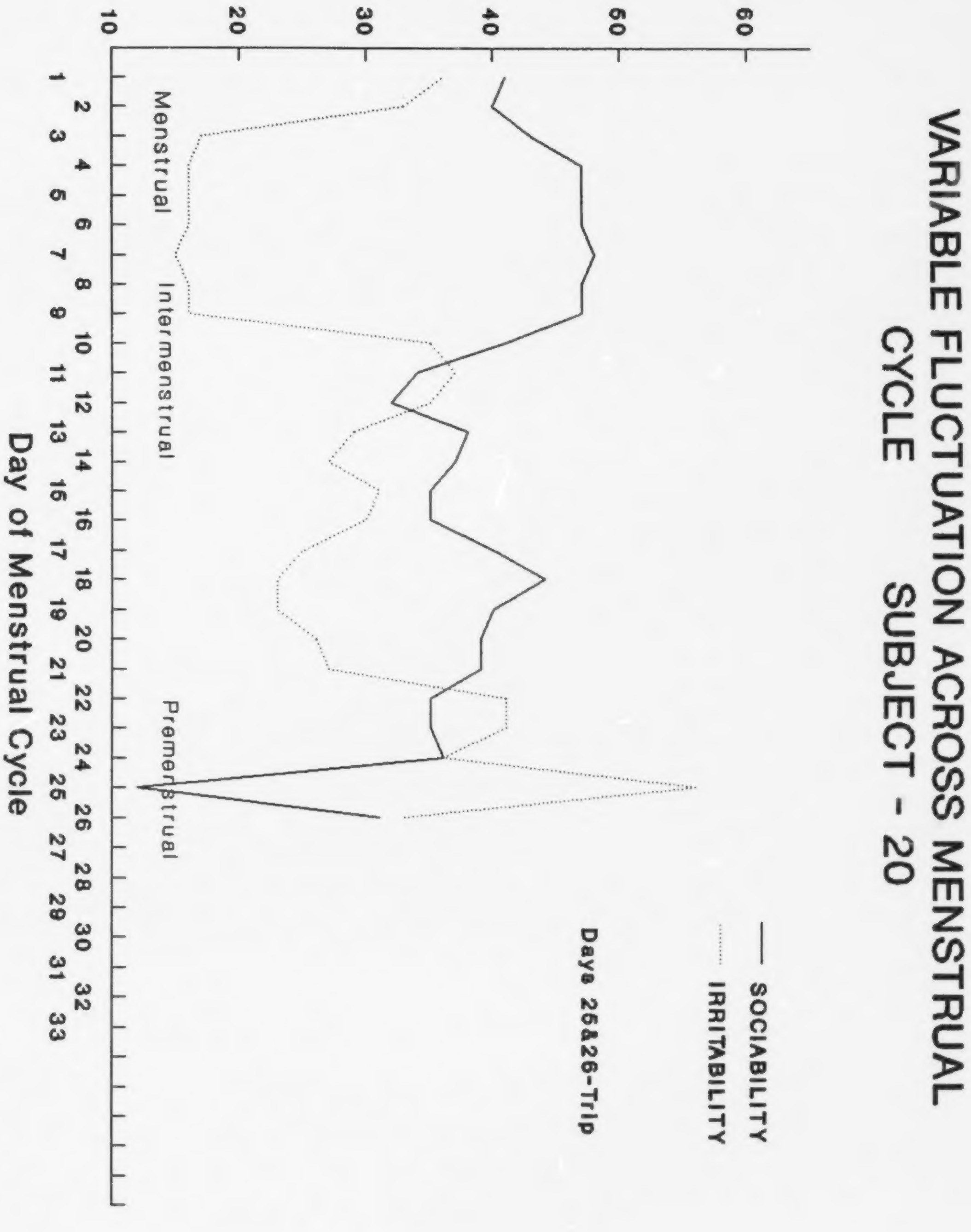

VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 19
SOCIABILITY
IRRITABILITY
Day 1-Relative died
Day 12-job stress
Day 17-Ill
60
50
40
30
20
10
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle

Figure D-40.


VARIABLE FLUCTUATION ACROSS MENSTRUAL CYCLE SUBJECT - 20
SOCIABILITY
IRRITABILITY
Days 25&26-Trip
10
20
30
40
50
60
Menstrual
Intermenstrual
Premenstrual
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33
Day of Menstrual Cycle